1378

Scientific Review
AND
SCIENTIFIC AND LITERARY REVIEW,
A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,
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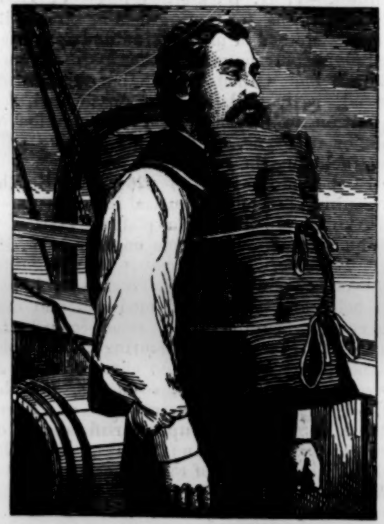

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(*Continued on page* 30).

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FEBRUARY 1, 1876.

NOTICE TO OUR SUBSCRIBERS AND READERS.

Arrangements are progressing for the improvement and ultimately the enlargement of the SCIENTIFIC REVIEW.

ENDOWMENT OF SCIENTIFIC RESEARCH.

"Virtue is its own reward" is a very hackneyed phrase; but whether this kind of reward is all that mankind will hold to suffice for practical purposes, must be somewhat doubtful to all who look to the realities of life as they exist around us. And if this be so of Virtue, how much more will it be the case if the same sentiment be applied to Science,—knowledge for its own sake being said by some to be its own recompense,—a dictum worthy of universal acceptation, if it be not construed as the *only* recompense it *ought* to afford its votaries: for if we look at the matter practically, it will be seen that to seek to reward knowledge in this way *only*, is to lift ourselves out of the every-day world into the regions of transcendentalism. No one can live without the means of living, and, as neither virtue nor knowledge will enable us to live without the vulgar agencies of so doing, we must, if we wish to see the progress of knowledge advance at its best pace, in someway provide that the pursuit of science or knowledge shall ensure to those who join in it such an amount of the means of living, as under all the circumstances of the case they may be fairly entitled to.

That in this country we have neglected, or rather ignored, the claims of scientific workers must be readily admitted, for there are but few public emoluments or pensions which are made applicable to such workers, and even these, as compared with the rewards of ordinary officialism, are mean or insignificant.

But it may be urged that the application of science to commercial and other matters will make it remunerative; and, further, that the Patent Laws provide for recompense out of the profits of the practical application of science. All this, however, by no means meets the difficulty, since it so happens that there are many points wherein scientific investigation is much to be desired, the practical application of which investigation it is by no means easy to foretell; and, in fact, purely scientific discoveries have been often made a generation before any practical application of them, yielding pecuniary profit, has been effected We are thorough-going advocates for allowing remuneration to be obtained out of results in the way in which our Patent Laws profess to effect this; but we cannot admit that pure science is capable of being dealt with in that way. Its advancement is a great national public benefit, and it seems clear to us, therefore, that the nation ought to pay for it.

We have been induced to give our best consideration to this subject, by a small work recently issued by that eminent science worker, Mr. Richard A. Proctor, author of "Saturn," "The Sun," "The Moon," "The Universe," &c. (published by Smith, Elder, and Co., of 15, Waterloo-place, London), wherein he seems to deprecate State-aid to scientific research, and, as we have thus stated our own views, we will now, *per contra*, present our readers with some notion of his, as he states them in the Introduction Chapter of his work:—

"I believe that men of science can do much more for themselves in this matter than the nation can do for them; or, to speak plainly, that it is the duty of men of science to refrain from an appeal to the nation for assistance when the means lie ready at hand for making science self-supporting. Such scientific assistance as the State requires may indeed be offered to the nation, and for such assistance science should receive due remuneration. Researches calculated to advance the material interests of the nation will also always in good time secure national recognition, and be remunerated accordingly. But pure science does not need to go begging for State subsidies, nor can science be otherwise than degraded when claims for assistance offered in her name are supported by promises which have no foundation in fact.

"The abstract principle that science is worthy of State assistance is one which commends itself to most students of science; and the opinion that such assistance can be rendered without risk, and ought therefore to be rendered without delay, is sufficiently natural. Men of science are not necessarily able or ready to consider all the consequences of a scheme which, in the abstract, seems eminently worthy of approval. The man to whom the study of science affords the highest gratification of which his nature is capable, is not quick to suspect the possibility that some who speak warmly about science may not have scientific interests solely in their thoughts."

Mr. Proctor, as might be expected, maintains the general spirit of these views in a very able manner, and in a note refers to his own case as supporting their practical worth; but whilst by no means wishing to dispute with him as to the difficulties attending any particular form of public reward, and with all due deference, we have to remark that he, like very many of our scientific men, has, according to his own showing, taken to science as a special business, so to speak, by accident, and therefore it argues nothing to meet the case of those who, having taste and talents for scientific research, would devote themselves thereto, but are deterred by the pecuniary difficulty in which they would be thereby placed; and that thus the public lose the benefit which might be derived from the labours of many an earnest and well qualified worker.

Reviews.

LONGFELLOW'S POEMS.

"The Masque of Pandora, and other Poems." By Henry Wadsworth Longfellow. London: George Routledge and Sons.

Milton described Eve as—

> "More lovely than Pandora, whom the gods
> Endowed with all their gifts."

There is no part of heathen mythology upon which a poet could better build a drama than the disastrous work of Hephæstus, produced at the command of Zeus. Beautiful as is Mr. Longfellow's description of the breathing the breath of life into the woman Pandora, we think it lacks the fire of true genius and art of eloquence. There are, however, portions of the drama superior to anything he has given us before. The following is the speech of Prometheus, who had stolen the sacred fire—

> "I hear the trumpet of Alectryon
> Proclaim the dawn. The stars begin to fade,
> And all the heavens are full of prophecies
> And evil auguries. Blood-red last night
> I saw great Kronos rise; the crescent moon
> Sank thro' the mist, as if it were the scythe
> His parricidal hand had flung far down
> The western steps. O ye Immortal gods,
> What evil are ye plotting and contriving?"

Amongst the gods and goddesses, we find Mr. Longfellow has omitted Apollo and Aphrodite. We do not know why this should be: the one having taught her to sing, and the other bestowed upon her grace and beauty. A drama built upon the mythology of Greece or Rome should, we think, be true to the text, and not left to the play or imagination of the poet. This drama, however, shows great dramatic force, and proves the genius of the poet is as fresh as when he gave to the world his beautiful "Golden Legend."

"The Hanging of the Crane" is another poem which occupies a large portion of this book, and "Morituri Salutamus:" the latter, in heroic verse, has much beauty; in speaking of the great Italian poet as the instructor of his youth, we have the following lines—

> "O, never from the memory of my heart
> Your dear, paternal image shall depart,
> Who while on earth, ere yet by death surprised,
> Taught me how mortals are immortalized."

"Almafi," a charming trochaic poem, has also all the freshness of the author's earlier writings, and is, we think, the best composition in the book. There are also elegaic sonnets on Keats and Milton: the former especially touching, in which, taking the words of Shelley, he is greeted as the young Endymion.

Mr. Longfellow is so well known on this side of the Atlantic, and his poems so widely read, that this volume will be another light to the crowd of his admirers.

TISSANDIER'S PHOTOGRAPHY.

"A History and Handbook of Photography." Translated from the French of Gaston Tissandier. Edited by J. Thomson. Sampson Low and Co.

As a handbook of the most important process of photography—the collodion process —this may be recommended; but as a history of photography it is by no means a complete work.

ROUTLEDGE'S NINETEENTH CENTURY INVENTIONS.

"Discoveries and Inventions of the Nineteenth Century." By Robert Routledge. Routledge and Sons.

The author states that he has aimed at giving a concise but clear description of the discoveries and inventions which have been made within the present century. So vast an undertaking might well appal any one; but there are always persons capable—according to their own opinion of themselves—of fulfilling any task, however large. We think the aim of the author was too high, and that the word "some" ought to stand as the first word of his title.

BRITISH INDUSTRIES.

"British Manufacturing Industries. Pottery, Glass and Silicates, Furniture and Woodwork, Iron and Steel, Copper-smelting, Brass-founding, &c., Hosiery and Lace, Carpets, Dyeing and Bleaching. Stanford.

These are parts of a series intended to enable the general reader to comprehend recent manufacturing development. The essays are by men of note, each in his way, being, in the order of the subjects, MM. Arnoux, Barff, Pollen, W. M. Williams, J. A. Phillips, W. Graham, W. Felkin, C. Dresser, and T. Simms, most of whom have a practical knowledge of the trades and processes described.

GUTHRIE'S MAGNETISM AND ELECTRICITY.

"Magnetism and Electricity." By Fredk. Guthrie. (Collins's Advanced Science Series.)

A large amount of information is here compressed into small compass. The explanations, generally speaking, are exceedingly lucid, and always marked by the freshness which springs from original thought.

RAILWAY TECHNOLOGY.[*]

"Die Technik der Eisenbahn—Betriebe's unt Signalwesen und Werkstätten." Von E. H. Von Waldegg. Williams and Norgate, 4, Hälfte.

This technology book has been produced within the last few weeks. Connected as this journal is with the development of science and mechanical improvement, we are filled with a sense of responsibility and almost of awe—of professional zest and of eagerness—and ask our readers to pause whilst we turn over the leaves of so large and so learned a book, which is on railways alone, and but the fourth part of a number of volumes which constitute a gigantic work upon technics. The author commences by regretting that while England and France possessed works on the subject, Germany did not; and, therefore, it was his desire, and that of his colleagues, to codify all the knowledge extant on German railway technology, and to suggest improvements. And then he goes on in chapter after chapter to take up the organization of Betriebe's signals and telegraphy, locomotives, goods conveyances, station buildings, instruments against snow, including, we believe (whilst borrowing from America) some new systems, stock, and construction, and well-digested divisions; the whole terminating in a voluminous atlas of every species of machinery. We doubt if we possess a deliberately prepared handbook like this upon the subject. Upwards of twenty-five years ago there was a well-known English Pocket Encyclopedia to be found in good private libraries, the volumes of which were about the size of those of a handy edition of Sir Walter Scott's novels, each devoted to a branch of practical science; but this was only a shadow of the book before us. The recommendation in chief is, that the compilation of such a work is a thoroughly practical idea. The atlas should be studied by inventors.

Some of Mr. Waldegg's assistants are Professor De Kick, Central Inspector Beckers, Engineer Close, Master Machine-Master Meyer, Overseer Buresh, Councillor Sonne, Professor Dr. Winkler, and Machine-Master Frank. Mr. von Waldegg himself is principal overseer in Hanover, and editor of the Technical Journal of the United German Railways. We are inclined to think, but are not absolutely certain, that there is something new propounded in the systems of mountain railway technology, points of which, as we are in process of railway extension, for the sake of the colonies, and that the English may be employed on the Continent, worth thinking over. A better system of primary railways is very much required in the colonies, hampered as they are for such purposes by bush, stream, and rocky and mountainous regions. Some of the methods resorted to have promised very well at first, but only endured a few months, such as miniature lines and corresponding locomotives and carriages with peculiar and very large flanges, so involving the local governments in financial disaster, though it must be admitted that many of the German lines as now worked are not equal to ours for rapid commercial communication. Certainly the authors have brought an enormous amount of erudition and science into play, in order to lay hold of a tremendous modern theory; whilst at the same time their handbook is a continuous mass of practical statements and calculations. So that the German technology for the future, if it were followed out immediately on the plans proposed, would be of a very superior order. Looking at their efforts in the manufacture of engineering and war implements, it is necessary to recognize the genius of the nation, however slow it be in operation. The other technical works are of a partly kindred nature, and show the amount of study going on. The handbook of surface construction in iron and other metals is very complete. "Fossil Animals in the Coal Formation" is the first part of a continuation of the Fossil Flora of Saarbruck, with interesting plates. The work on Zoology affords a valuable contribution to the study of invertebrates, and Mr. Moleschott's metaphysical book is a new edition of a work written shortly after the Anti-Hegelian reaction.

COOLEY'S PHYSICAL GEOGRAPHY.

"Physical Geography of the Terraqueous Globe and its Phenomena." Illustrated with 125 wood-engravings, frontispiece, and 12 maps. By William Desborough Cooley. London: Dulan and Co. 1876.

Here we have a really good work on this subject, which, if taken in the wide sense that Mr. Cooley views it, is a very large one, for he informs us in his preface that he considers it to be a department of science that embraces the course of physics as appertaining to our globe. But we shall perhaps convey the true idea of the contents of the book by presenting our readers with the author's own statements relative to the matter. After remarking that Immanuel Kant, Dr. J. C. E. Schmidt, Dr. Maedler and Humboldt have given a wide range to the subject, he adds that Sir J. Herschel has referred to it in the following terms:—

"We find ourselves thus introduced to the domain of physical geography, or the description of the actual state of the earth's surface in its three great divisions—land, sea, and air, as prepared for the habitation of organic beings, and as exhibiting the play of all those complex agencies on which depend the distribution of temperature and moisture, aerial and oceanic currents, and those conditions which, under the general title of climate, determine the abundance and limits of vegetable and animal forms."

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[*] Technik der Eisenbahn, Waldegg; Bau Constructions Lehre f. Ingemeure und Steine Constructionen; Frauenholz; Atlas der Mechanischen; Technik, Hartry u. T. Weiss; Handbuch der Hochbau-Construction in Eisen u. Anderen Metatlen Engelmann, Die fossilen Theire aus der Stemkohlen formation v. Saarbrücken, Dr. Goldenberg, Grundrissder, Zoologie, 2, Halfte, G. Koch; Der Kreislauf des Lebens Jac Moleschott; Das Haustorium der Lozanthauen und der Thallus der Rafflesiaceen u. Balanophoreen, Graf Sohns Laubach. Williams and Norgate.

Thus as to the objects and scope of physical geography we are fully instructed by the eminent men who brought it into vogue.

But about half a century ago, when physical science was little cultivated in England, some ardent students of geology were pleased to collect those rudiments of geography which are more immediately connected with their own pursuits, and presented them to the public ennobled with the title of physical geography, the word physical being here used in its vulgar sense, to exclude moral, political, and other such consideration. In this sense it is evident that every book on geography includes physical geography.

In the writings of Sir Charles Lyell and of Sir R. I. Murchison, the expression physical geography always signifies merely the conformation of the earth's surface. Mr. B. Jukes defended this as the correct application of the name. When these authors tell us of frequent changes in the physical geography of the earth, we must understand them to speak of an altered conformation or change in the distribution of sea and land. It is obvious that in this sense physical geography cannot be a science; yet it is often appealed to as such. The same confusion of ideas has descended to the disciples of the above-named founders of geology; and we have at present numerous treatises on physical geography which are in reality merely outlines of geology, without a trace of physical science.

Under the patronage of the Royal Geographical Society, the study of Geography has been divided into two branches, viz., Physical and Political; but the purpose or advantage of this division has never been explained. Indeed it would appear, from the published specimens of the examination papers, that no thought has been expended on the subject. Synclinal and anticlinal lines, escarpments, and all details pertaining to Geology belong to Physical Geography; but mountains, rivers, and every thing else lie within the province of Political Geography. In short, the useless attempt is made to distinguish between a description of the earth and a description of the countries and kingdoms of the earth, the natural philosophy involved with geographical considerations being in the mean time forgotten.

Some writers have included in Physical Geography the distribution of plants and animals over the earth. There is, however, a broad distinction between Physical Science and Natural History, and the attempt to blend them can never succeed; for Natural History is made up of multitudinous details. Species of plants and animals are reckoned by thousands. But the generalizations of science ought to follow the particulars, and can be fully understood only by those well acquainted with the latter. An attempt to explain the geographical distribution of plants, for example, if it does not give a full account of them, but only their names, must be dry and uninstructive; but if it does give such an account, it is no longer Geography, but Natural History.

In various chapters the work treats of the universal character of Terrestrial Physics, the Earth, the ancient observation and modern knowledge of the Heavens and relation to the Earth; the sphericity of the Earth; the sources of heat; terrestrial radiation; the atmosphere; water; temperature, winds, clouds, and rain. And much information is given as to the ocean, mountains, electricity, hail, magnetism, light, and the motion of the earth.

As a sample of the contents of the work, we may cite the following statement as to the increase of heat found upon descending the interior of the earth:—

A curious proof of the increase of heat downwards is to be found in the history of an attempt made to dig a well in the frozen soil of Eastern Siberia. The River Lena, near Yakutsk, late 62° 2′ N., frozen during eight months of the year, overflows its banks soon after the breaking up of the ice, and rushes down in an immense flood excessively turbid and impure. It was in the hope, therefore, of finding pure water at the depth of five fathoms, or the lowest level of the river about a mile distant, that the Russian merchant Fedor Shergin, residing in Yakutsk, commenced in 1828 to sink a well. The progress of the work was unexpectedly slow. The workman thought he had struck upon a rock, and some time elapsed before it was understood that it was a frozen soil. In 1831 a depth of 105 feet had been reached without penetrating through the frozen ground, and the undertaking would have been abandoned had not Admiral Von Wrangell, passing through Yakutsk on his way to America, perceived the interest attaching to it, and urged on the Imperial Academy of Sciences at St. Petersburg its further prosecution for the benefit of science. In 1837, when the depth of 382 feed had been reached—still in frozen ground—the well was carefully covered over to exclude the external air, and in 1844 its temperature throughout was examined by Middendorf for the Academy of Sciences.

The general conclusions arrived at from the observations made were, that the ground is perpetually frozen to a depth of 612 feet, and that the distance which, in descending is attended with an increase of temperature of 1° Fahr., is near the surface 4 feet; at a depth of 100 feet, 20½ feet; at 200 feet, 40 feet; at 300 feet, 60 feet; and at 400 feet, 78 feet.

It must not be supposed that the cold of the Siberian winter at the present day, though extremely intense, can freeze the ground to a depth of 600 feet. The frozen soil in the valley of the Lena is a formation of what geologists call the glacial period, and may be regarded as an aqueous rock, protected from change beyond the depth of a few feet by the shortness of the summer and the general rigor of the climate.

In another part of the work Mr. Cooley, in referring to the distribution of water and moisture, makes the following noteworthy statement. At Bahrein, in the Persian Gulf, the arid shore has no fresh water. This, the hottest region of the earth, has little or no rain; but the population, comparatively numerous, derive their supplies from springs in the sea. The diver, winding a great goatskin bag round his left arm, his hand grasping its mouth, descends, takes in his right hand a heavy stone, secured by a strong line, which is tied to a boat. Plunging with this, he reaches the bottom quickly. Instantly opening the bag over the strong jet of fresh water, he springs up in the ascending current, at the same time closing the bag. The stone is then hauled up, and the diver, taking breath for a few minutes, plunges again. The source of these very copious springs is probably in the green hills of Omân, 500 or 600 miles distant. Similar springs, fed perhaps from the Alps, exist in the Gulf of Spezzia, and at many points on the shores of Greece.

MIDNIGHT MISSIONS.

"London by Moonlight Missions." By Lieut. J. Blackmore, R.N. Broom, Paternoster-buildings.

This work is actually published by Edward Robson, 64, Edgware-road, W., but the book may be most easily obtained as above. It is impossible to be blind to the quantity of labour of the kind of which Lieut. Blackmore was an apostle going on at present in London, or to ignore the branch of literature which springs up accordingly. He attempts, and from his own account very successfully, to reclaim the vicious female classes, and to turn the fast young men of the day into more prudent courses, in which latter view it would be advantageous to his cause did his account fall within the reach of such persons. It commences with a memoir of the author, and comprehends a few narratives by other missionaries, whose initials only are given, and letters and statements by the repentants, one of whom is a young lady once an inmate of the Female Temporary Home,—not the only institution of the kind established, directly or indirectly, by the exertions of the author,—but now a governess in Tasmania. It appears that the Lieutenant was one of the first to inaugurate Moonlight Missions and Homes in London, and his impressions are therefore interesting. Dr. Guthrie, the celebrated Presbyterian preacher, took up the same subject in Scotland, and his work, "The City: its Sins and Sorrows," has been a good deal admired. If a word of advice would be received in good part from us by the London missionaries, it would be to write their books more like the Scotch clergyman's: that is to say, in the style of a first-rate literary effort, with only a few documents. We are cognizant of the strenuous efforts of the London Preventive and Female Reformatory Association, which has probably taken up the good work set on foot by this naval officer, and of the interest taken by the Earl of Shaftesbury. It is quite possible that, under vigilant official as well as private benevolent search, the evil may be mitigated. The reports of the said association are also deserving of general perusal. In this grasping, selfish world, it is well to be reminded occasionally that "the quality of mercy is not strained, but droppeth as the gentle dew from heaven." And the work before us insinuates some such precept. The author had a practical way of conducting his missions, namely, beginning in most cases by instantly relieving the hunger or pressing necessities of the poor females in the streets. He mentions of one case which he took up: "I shall never forget her look of gratitude, nor the pressure of the thin hand, when I said good-bye." The *Times* noticed the efforts of Lieut. Blackmore in 1847. We believe this book to be of use, inasmuch as it gives an account of the earlier exertions, which have resulted in the present extensive organization.

DARWINIANISM.

"All the Articles of the Darwinian Faith. By Rev. F. A. Morris, B.A. Moffatt, Paige, and Co.

This is a very good pamphlet for reference in the study of the deeply interesting question involved. Those of our readers who have a knowledge of the subject will find the whole of the articles amusingly abstracted, in thirty-four small pages; while the remaining sixteen give a kind of commentary. The author says—Mr. Darwin has treated us to tendencies, probabilities, and conjectures, which derive all their force from a previous assumption of the point to be proved. Credit, however, is given for numerous interesting observations on natural history, exhibiting relevancy to the argument it seeks to sustain. The author inveighs almost as severely against Professor Huxley. He says: "Granting that in physical structure man approximates nearer to the ape than the ape to the lowest monkey, this is no argument for either being descended from the other, till we have admitted the two previous hypotheses—universal evolution and the savage of man." The commentary exhibits a good deal of sense and Christianity of thought. The arrangement of the articles is obviously designed to show what the author deems absurdities in the Darwinian theory. For example: "I believe that my theory of natural selection is right, and everyone who does not hold it is in the wrong, although the difficulties are so grave, that to this day I can never reflect on them without being staggered." Again: "I believe that my theory is right, although I allow that according to it 'all nature' ought to be in confusion, instead of the species being, as we see them, 'well defined.'" A number of specific allusions to animals are entered into. Mr. Morris must be possessed of some learning, at any rate, to accomplish the technical digest he offers to the British public. The price of this pamphlet is only a shilling; and if an over zeal for sharp, direct reasonings and incontrovertible theory be displayed, there is the foil presented of wit and knowledge of the subject. Mr. Morris is author of "A History of British Birds."

PRACTICAL EDUCATION.

"Practical Educationists and their Systems of Teaching." By James Leitch, Principal of the Church of Scotland Normal School, Glasgow. Glasgow: James Maclehose. 1876.

This work is not a dry exposition of educational systems; being mainly a series of delightful sketches of the work and the lives of various men who have promoted educational improvement. It is pleasant to read, and is withal fraught with much instruction for all who wish to aid the progress of education in this country.

Each educationist in the series is (as Mr. Leitch truly states), so to speak, a representative man, and has more or less left the impress of his personal teaching or principles on English Education. Locke brings before us the great public school system of England, and is the chief advocate we have for private education. Pestalozzi is the father of industrial and elementary schools for the people; Bell and Lancaster created the monitorial and subsequent pupil-teacher system, now widely prevalent; Stow displays the fruit of the training system in full maturity; Wilderspin's name is indelibly associated with infant schools; and Spencer is our leading champion for science teaching. Other educationists of equal merit and interest might have been included, but it was necessary to reduce the book to a reasonable size. Should this volume prove serviceable, it may, says the author, be followed by another.

The papers enter into greater detail than may, perhaps, to the general reader seem desirable: but when it is considered that one object of the book is to enable teachers, from the descriptions given, to apprehend and put into practice methods which in some instances must be quite novel to them, the details will not be considered out of place. In general, the work is confined to what is likely to prove useful and interesting; and when it has been at all convenient, each author has been allowed to describe his methods in his own words, Mr. Leitch's own experience and opinions being interspersed throughout, forming a most useful addition.

The book will be found to contain a comprehensive view of the systems of the educationists taken up. Each paper has been prepared with care; and, doubtless, the whole will prove serviceable in saving the time and labour of all educators, who have a desire to study minutely the principles of their profession—a great many of the books referred to being either out of print, or not readily accessible to the ordinary schoolmaster.

The book should also prove of much service to members of school boards interested in the history of education, and in the details of school-method, many points of interest and usefulness to them being fully discussed in its pages. To such (says the author) as are desirous to make themselves familiar with recognized principles of teaching, I can suggest no more interesting way than that by which they are here illustrated. As practical educationists, they will find it beneficial to make themselves acquainted with the best and most advanced results yet reached in education: bearing in mind that "in order to make discoveries that shall help the great cause forward, one must start where the great masters have stopped. The systems of education that have borne sway in the world, the principles on which these systems have been based, their results, and the causes of their successes and failures—all these must be understood by those who are to make any real progress in education. And more than this, a knowledge of what has been done before him puts the student in possession of the best principles for his guidance in administering any system."

The various chapters refer to the educational views of Locke, Pestalozzi, Dr. Andrew Bell, Lancaster, Wilderspin, Stow, and Herbert Spencer; biographical statements being given in connection with all but the last named.

Reviews Postponed.—"Lessons from Nature," by St. George Mivart. "Air and its Relations to Life," by W. Noel Hartley, F.C.S.

"Old Jonathan."—With the issue of the January number of *Old Jonathan* a new series has been commenced, the size being altered to a handier and more suitable form. It is illustrated with a number of excellent engravings, and retains its distinctive character as a cheap popular religious publication. While interesting to all, it is well suited for general distribution, and cannot fail to delight young and old; and will doubtless help to counteract the influence exercised by the trashy literature of the day.

NOTES ON RECENT SCIENTIFIC BOOKS.

Amongst puzzles which resemble the title of a lecture once given by a well-known Melbourne *litterateur*, viz., "The Lost Secrets of Christianity," but which was, however, rather amusing to his *confrères*, is the universal query *Τί κείνον* at this time—what are the new books? It is and it is not absurd. The first in the case of scientific works: why should they be born at this time, instead of appearing continuously from November until the sessions of the learned societies are over? The second affects poetry, fiction, and the superior kinds of pleasure books.

Having had the advantage of a peep at the repositories of some of the scientific publishers, we are inclined to think that medical and chemical science works make a strong effort to exceed in numbers. There is a very fine book just issued by Messrs. Longmans—the second volume of a "Dictionary of Chemistry and the allied Branches of other Sciences," by Mr. H. Watts, B.A. Editor of the Journal of the Chemical Society. It is voluminous, the print is small, and full of elaborate calculations. The latter point is certainly important, as were they of the superficial tendencies of the day to be admitted into the medical and chemical sciences, the axe, if we may be pardoned an old but apposite expression, could then be truly said to be applied to the tree of our very existence. We say this advisedly, having never had any determination towards "Material Shakers," as they may be called who have formed themselves into a company vowed never to avail of the healing art; at the same time, we do not intend to exalt the medical science above others, such as law and engineering, except on the point of humanity. To resume: an advantage of this work is, that it brings a record of all that has transpired down to the end of 1872, and notices a few important novelties of the two following years. It is disposed in articles, arranged alphabetically, such as Arsenic, Chloroform, Electricity, Explosions. Of course the possession of complete reports of science in this way is very handy—or rather of an expert condensation of them, which affords a history as well as a severe and complete text book. It is very probably from chemistry that we are to expect some of the extraordinary new conveniences and ways of living in the future fifty years; and looking to the wonderful general development which has accrued since the Waterloo year, and the go-a-head spirit of the time, we may require only the application of a number of clever heads steadily to the subject to give us results more useful and almost as astonishing as the feats accomplished by Merlin and Cagliostro. It is well they should have copious and apparently thorough enough sources like this to take supplies from for their recondite explorations. Chemistry is indeed a noble science, because it is constantly dealing with the origin of things, and affords such an excellent field of discovery.

In the "Chemical Technology" it is unfortunate that vols. II. and III. are out of print, especially vol. III., which takes up useful everyday topics, like bread, cheese, tea, coffee, tobacco, milk, and sugar, illustrated, price £2 10s.; but the same may be had with a complete set of the "Technology." The said volume would be useful to inventors—*hinc illæ lachrymæ!* Next we mention vol. I., part 3, of a complete treatise on acids, alkalies, and salts, their manufacture and applications, by Thomas Richardson, Ph.D., F.R.S., and Henry Watts, B.A., F.R.S., price 33s., which treats of uses of sulphur, the burners, and manufacture without chambers; common salt; soda from marine plants, bleaching powder and liquids, potash, railway grease, aluminium, water-glass, hardening and preservation of building stone, silicious painting, saltpetre, and nitre; Persoz's method for the complete analysis of saltpetre, gunpowder, gun-cotton and pyrotechny. The gunpowder article includes the glazing, drying, and packing and firing by electricity.

We regret that the price of scientific works continues so high, placing them, to an extent, only within the reach of professional students, and it is to be hoped that the day is not far distant when copies of a great many of the best works may, through extensive sale, be purchasable from 2s. 6d. to 5s. An important work, "The Text-Book of Operative Surgery," translated from the French of Professors Claude Bernard and Huette, by Dr. Norton, of St. Mary's Hospital, is ready, or nearly so. We believe the "Anatomy of the External Forms of Man," for the use of artists, sculptors, &c., edited from the German, by Dr. Knox, with coloured drawings, price 42s., is a good work. "The Architecture of the Heavens," with 23 steel engravings and numerous wood-cuts, by Professor Nichol, Glasgow, price 16s., is an useful book; and would serve the purpose of persons desirous of forwarding invention in the important branch of astronomical instruments, those for solar observations and globes.

We give honourable mention to "Elements of Chemistry," by T. Graham, F.R.S., late master of the Mint, edited by Mr. H. Watts, two vols., each separate £1. Collenette's "Chemical Tables: Oxides, Sulphides, and Chlorides," with blank forms for adaptation to other compounds, price 6d.

The foreign works sold at Messrs. Bailliere, Cox, and Tindall's shop are mostly French, and some of them may be found at other booksellers. We mention a few interesting books at 2s. 6d. on philosophy, translating the titles:—"Science and Conscience," Vacherol; Taine's "Study on Carlyle; English Idealism;" Leveque's "The Spiritual in Art;"

Saisset's "Criticism and History of Philosophy;" Bost's "Liberal Protestantism;" Dumont's "Heckel and the Theory of Evolution in Germany;" Langel's "Optic and the Arts." In general standard French work medicine prevails. There are a number of works like Onimus and Legro's "Treatise on Medical Electricity," 12s.

We note that some of the specially foreign booksellers complain bitterly of the public sending abroad through their own booksellers. This is perhaps almost a pity when the works may be had at once, and perhaps cheaper.

REGISTRATION OF TRADE MARKS.

IN the number of the SCIENTIFIC REVIEW for December, 1875, we gave the text of the Trade Marks Registration Act, 1875. We now give an abstract of that Act, and an abridgment of the Rules issued on 30th December, 1875, referring to each section of Act and number of Rules :—

Section 1. A Register is established under superintendence of Commissioners of Patents, and registration made compulsory from and after 1st July, 1876.

Section 2 requires registration of trade marks by classes.

Rules 1 to 4 are preliminary; rules 5 to 11, *Application for registration.* A person wishing to register will be required to send in *a statement* with the following particulars :—

(A.) The name and address and calling of the applicant.

(B.) The description or reference to a description of the trade mark to be registered.

(C.) The class or classes of goods (being some one or more of the classes hereafter specially mentioned), and the particular description or descriptions of goods in such class or classes, with respect to which he desires the trade mark to be registered.

(D.) In the case of a trade mark used *before the passing of this Act*, a description of the goods in respect of which it has been used and the length of time during which it has been so used.

"*The statement* (signed by the applicant) is to be on foolscap paper of a size of thirteen inches by eight inches, and to have on the left-hand part thereof a margin of not less than one inch and a half.

"Subject to any other directions that may be given by the registrar, a description of a trade mark shall be given in writing, and shall be accompanied, when practicable, by a drawing or other representation in duplicate, not less than three inches square, on foolscap paper of the size aforesaid, or by pasting or otherwise fastening on such paper a specimen of the trade mark.

"Where a drawing or other representation or specimen cannot be given in manner aforesaid, a specimen or copy of the trade mark may be sent either of full size or on a reduced scale, and in such form as may be thought most convenient.

"The registrar may, if dissatisfied with the representation of a trade mark, require a fresh representation either before he proceeds with the application or before he registers the trade mark.

"The registrar may also, in exceptional cases, deposit in the Patent Museum a specimen or copy of a trade mark which cannot conveniently be placed on his register, and may refer thereto in his register in such manner as he thinks advisable."

A DECLARATION on foolscap paper of the above-mentioned size, "must verify the statement," and declare that, to the best of the applicant's knowledge and belief he is lawfully entitled to use the trade mark. An acknowledgment of deposit of application is to be sent to the applicant.

Rules 12 to 15. On the receipt of an application the registrar shall require the applicant to insert an advertisement of the application in the official paper, during such time, and in such form, as the registrar may think desirable, and distinguishing whether the mark has or has not been used before August 13th, 1875. The official paper for the purposes of these rules shall be some paper published under the direction of the Commissioners of Patents, or such other paper as such Commissioners, or any of them, may from time to time direct. For the purposes of such advertisement the applicant may be required to furnish the printer of the official paper with a woodblock or electrotype of the trade mark.

NOTICE OF OPPOSITION is to be sent in duplicate, one copy being transmitted by the registrar to the applicant. Within three months of receipt of such notice a counter statement is to be sent in by the applicant, or his application will be considered withdrawn. The objector will then be required, within fourteen days, to give security, or his objection ceases. The fee for notice of opposition is £2.

Rules 16 to 22. On the expiration of three months from the date of the first appearance of the advertisement in the official paper, the registrar may, if he is satisfied that the applicant is entitled to registration, register the trade mark on payment of the prescribed fee.

Conflicting applications. Where each of several persons claims to be registered as proprietor of the same or a nearly identical trade mark, in respect of the same goods or goods belonging to the same class, the registrar is to use his discretion as to registering all or any of such trade marks, either unconditionally, or on the condition of the introduction of such variations (if any) or otherwise as he thinks fit, or the registrar may, if in any case he thinks it expedient, submit or require the claimants to submit their rights to the court.

Identical trade marks not to be registered in the same class, or "with respect to the same or similar goods as belonging to another class."

These Rules are in accord with Sections 5 and 6 of Act.

The date of application will be deemed the date of registry. No notice of a trust to be received or entered on register. Notice of registration to be sent to the applicant.

Rules 23 to 29. The person to whom any registered trade mark has been assigned or transmitted may apply to be registered as subsequent proprietor thereof on the production of suitable evidence defined by the rules.

Rules 30 to 45 make the following provisions :—

Alterations and rectifications of the register may be made by leave of the court, the fee being 10s. Such alterations are subject to opposition. An alteration of address will be inserted in the register for a charge of 5s.

The protection is to hold good for 14 years, and can be renewed for a new fee (£2, if paid before the expiration of the 14 years, or £3 if paid within three months of the end of such period). A lapsed or unrenewed mark can also be restored on the payment of an "additional fee."

The court may, on the application of "any person aggrieved," remove any trade mark from the register on the ground, after the expiration of five years from the date of the registry thereof, that the registered proprietor is not engaged in any business concerned in the goods with respect to which a trade mark is registered. A trade mark, like one *removed*, is not to be registered for five years.

The court for the purpose of the Act is declared to be the Chancery Division of the High Court of Justice. Application to the court may be made by motion, or by application in chambers, or in such other manner as the court may direct.

The decision or action of the registrar is subject to review by the court, to which it would seem, it is to be presented in the form of a special case settled by the registrar.

The Act.—Section 3 makes registration *prima facie* evidence of the right, and after being five years on register *conclusive* evidence.

Section 4 enacts that every person subsequently registered as proprietor is to stand in same position as the original registree.

Sections 5 and 6 relate to wrongful registration (see Rules, especially 16 to 22).

Section 7 relates to making of rules and fixing fees.

Section 8 gives authority to registrar's certificate.

Section 9 of Act refers to Cutlers' Company; and Rules 46 to 56, give effect thereto. Copies of all old Corporate marks are to be delivered to registrar 1st March, 1876. New Sheffield marks to be delivered as soon as practicable after mark has been assigned by Company. The period between notice to registrar and assignment of mark by company is to be six weeks from date of sending notice to registrar. Time for notice of application to Cutlers' Company to register trade marks to be as soon as practicable after application. This notice to be given by sending to Cutlers' Company a copy of official journal containing the mark in question. Trade mark not to be registered till six weeks from sending notice to the Cutlers' Company. Time for notice to registrar or Cutlers' Company of any mark to be fourteen days after registration, sufficient particulars to be supplied to identify the mark. Drawings or representations to be size of three inches square on foolscap paper of size aforesaid.

Rules 57 to 60 refer to the declaration and the evidence to be produced to registrar. Registrar may, in certain cases, dispense with these. The declaration is to be made and subscribed similarly to other statutory declarations. Seal of an officer taking declaration to prove itself. Proper legal substitute can make declaration, &c., for infant, lunatic, or incapacitated person.

Rule 61. Commissioners of Patents for inventions to have superintendence and direction of the registrar.

Rules 62 and 63. Notices to be served by post.

Rule 64. Rules to construed with Act of 1875.

Rule 65. Forms in 3rd Schedule to be used.

Definitions are contained in Section 10, and Section 11 gives short title of Act as—Trade Marks Registration Act, 1875.

FIRST SCHEDULE.—CLASSIFICATION OF GOODS.

Class 1. Chemical substances used in manufactures, photography, or philosophical research. Class 2. Chemical substances used for agricultural and horticultural purposes. Class 3. Chemical substances used in medicine and pharmacy. Class 4. Raw vegetable and animal substances used in manufactures. Class 5. Unwrought and partly wrought metals used in manufacture. Class 6. Machinery of all kinds, and parts of machinery, except agricultural machines and implements included in class 7. Class 7. Agricultural and horticultural implements and machines. Class 8. Philosophical instruments, instruments and apparatus for useful purposes, or for teaching. Class 9. Musical instruments. Class 10. Horological instruments. Class 11. Surgical instruments and apparatus. Class 12. Cutlery and edge tools. Class 13. Metal goods not included in other classes. Class 14. Goods of precious metals (including aluminium, nickel, &c.), and jewellery, and imitations of such goods and jewellery. Class 15. Glass. Class 16. Porcelain and earthenware. Class 17. Manufactures from mineral and other substances for building or decoration. Class 18. Engineering, architectural, and building contrivances.

Class 19. Arms and military stores, not included in Class 20. Class 20. Explosive substances. Class 21. Naval architectural contrivances and naval equipments. Class 22. Carriages. Class 23. Cotton yarn and thread. Class 24. Cotton piece goods of all kinds. Class 25. Cotton goods not included in Classes 23, 24, or 38. Class 26. Linen and hemp yarn and thread. Class 27. Linen and hemp piece goods. Class 28. Linen and hemp goods not included in Classes 26 and 27. Class 29. Jute yarns and tissues, and other articles made of jute. Class 30. Silk, spun, thrown, or sewing. Class 31. Silk piece goods. Class 32. Other silk goods not included in Classes 30 and 31. Class 33. Woollen and worsted yarns. Class 34. Woollen cloths and worsted stuffs. Class 35. Woollen and worsted goods not included in Classes 33 and 34. Class 36. Carpets, floor-cloth, and oil-cloth. Class 37. Leather, and skins unwrought and wrought, and hair and feathers. Class 38. Articles of clothing. Class 39. Paper (except paper hangings), stationery, printing, and bookbinding. Class 40. Goods manufactured from india-rubber and gutta-percha not included in other classes. Class 41. Furniture and upholstery: paper-hangings and papier maché being herein included. Class 42. Substances used as food. Class 43. Fermented liquors and spirits. Class 44. Mineral and aerated waters, natural and artificial. Class 45. Tobacco, whether manufactured or unmanufactured. Class 46. Seeds for agricultural and horticultural purposes. Class 47. Candles, illuminating oils, matches, and common soap. Class 48. Perfumery (including perfumed soap). Class 49. Toys, games of all kinds, archery, fishing tackle. Class 50. Miscellaneous, including—(1) Goods manufactured from ivory, bone, wood, not included in other classes. (2.) Goods manufactured from straw or grass, not included in other classes. (3.) Goods manufactured from animal and vegetable substances, not included in other classes. (4.) Tobacco pipes. (5.) Umbrellas. (6.) All goods not included in the foregoing classes.

A great number of illustrations of these classes are given in the rules; but, as they are stated not to be exhaustive, but are simply exemplars, we omit them in consideration of our limited space.

General Note.

Any wares made of mixed materials (for example, of both cotton and silk) shall be included in such one of the classes appropriated to those materials as the registrar may decide.

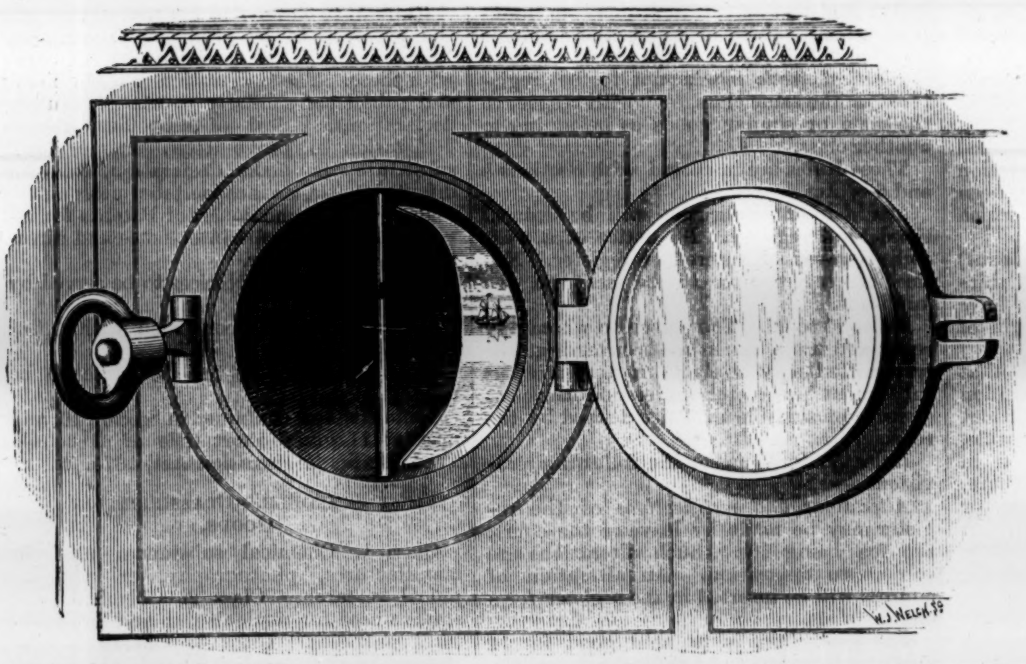
Second Schedule.—Fees.

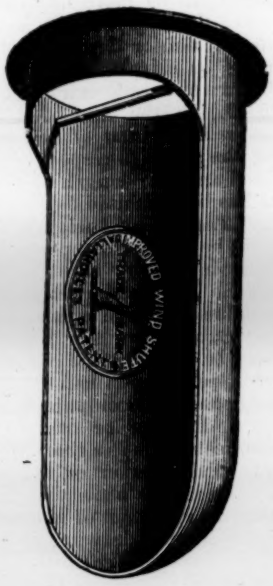
The following fees shall be payable to the registrar on or for the following occasions or purposes:—1. On application to register one trade mark for one or more articles included in one class, £1. 2. On application to register more than one trade mark for one or more articles included in one class, for each additional trade mark after the first, 10s. 3. On application to register a trade mark in respect of goods in different classes, for every class after the first to which such trade mark is extended, an additional fee of 2s. 4. For registration of one trade mark, £1. 5. Where the same person is registered at the same time for more than one trade mark, for registration of each additional mark after the first, 10s.

6. Where the same person is registered at same time for same trade mark in respect of goods in different classes, for the registration of one mark in each class after the first an additional fee of 2s. 7. For entering notice of opposition, £2. 8. For registering subsequent proprietor, £1. 9. For altering address on the register, 5s. 10. For every entry in the register of a rectification thereof or an alteration therein, not otherwise charged, 10s. 11. For continuance of mark at expiration of fourteen years, £2. 12. Additional fee where fee is paid within three months after expiration of fourteen years, £1. 13. Additional fee for restoration of trade mark when removed for nonpayment of fee, £2. 14. Certificate, £1. 15. Inspecting register every quarter of an hour, 1s. 16. Office copy, 2d. per folio, but never less than 1s. 17. Settling special case by registrar, £2.

A third Schedule of the Act gives the forms to be used.

ALLARDYCE'S IMPROVED PATENT WIND SHUTE.





A well-known difficulty in all passenger steamers, troop ships, and sailing vessels is to keep up a healthy current of fresh air in hot and sultry weather, especially in the tropics. As most steamers are now built with brass scuttles or ports, the fixing of the canvas windsail at their scuttles is a matter that requires no small amount of ingenuity; and it is found in practice that they can rarely be made to act efficiently, and require some auxiliary to make them really useful. Passengers in warm latitudes are often exposed to severe sufferings and danger to their health, which those only can appreciate who have had experience of such influences. The principle of this invention is to apply the ventilator shown in the engravings to the side-ports, and thus, by catching the air passing outside and directing or shooting it into the cabin or between decks, to cause a continual change of atmosphere. This it will do even when the ship is lying at anchor, and when the bow is naturally turned to the wind, but more especially when steaming or sailing, from the action of the very current which the movement of the vessel through the air must naturally create.

Should it happen that the vessel when at anchor turns its stern to the wind, the shutes being constructed of metal, and in the shape of a half circle, to fit the port, will turn either way, so that they may be at once reversed, to catch the wind. They are fitted with a shifting bar, for the purpose of reducing the amount of surface exposed to the breeze in proportion to its force. There can be little doubt that in the case of cattle-carrying steamers, where the impossibility of securing a proper amount of ventilation without artificial means is the principal difficulty which has to be overcome, wind shutes of this description will prove of immense advantage. They are made of either brass, zinc, or tin, and in proportion to the size of the scuttle, and can be placed so as to direct the current of air to almost any part of the cabin. The wind-shute may in wet weather be turned against the wind, and thus act as a screen, allowing the scuttle to be open whilst preventing the rain from coming in. In bright weather they may be used as a sunshade.

The engravings shew a view through an open port to which the shute is applied, and a view of the shute detached.

The inventor, Mr. Allardyce, has had long experience in matters connected with shipping, especially in tropical navigation. A full-sized working model may be inspected at Mr. Allardyce's offices, No. 14, Queen Victoria-street, London, E.C.

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President of Council:

SIR ANTONIO BRADY.

SESSION 1875-76.

Thursday, February 10th.—Meeting to make arrangements for promoting Patent Law Reform in the new Session of Parliament.

Thursday, February 24th.—On Trade Mark Law, and its availability for the requirements of Inventors and Industrial Improvers. By F. W. Campin, Barrister-at-Law.

Proceedings of the Institute.

AT the Executive Council, on 13th January, 1876, Dr. J. McGrigor Croft in the chair, after the confirmation of the minutes, it was unanimously resolved to recommend the Members of the Institute to elect Mr. Thomas Paterson as a Member of the Executive Council, and that a Special General Meeting for this purpose be called as early as may be. Mr. Whitehouse's resignation was reported; it was ordered to be accepted with expressions of regret. It was agreed that Notice of General Meetings should be posted to the Members with the SCIENTIFIC REVIEW.

At the Members' Meeting, on 13th January, 1876, the subject of Appliances for Railway Safety was brought forward by Mr. T. Morgan; but as some illustrative models had not yet arrived, a postponement was ordered to 27th January, special notice to be sent to the Members.

The subject was accordingly brought up on 27th inst., but we have to reserve the Report.

The following are New Members added since publication of last list:—S. Rowbottom, J. T. Gondie, T. De Vall, C. Mace, E. Rowland, T. Stevens, J. T. Stoneham, J. E. Henley, H. A Allardyce, R. Duncan, G. H. Stalkartt, Ed. Bacon, jun., Jno. Simpson, J. Newman, A.I.C.E., J. S. Lowe, Capt. Harding, C. L. H. Lammers, R. Henderson, G. A. Davenport, J. Y. Glossop, J. S. Wright, R. H. W. Dunlop, D. Rylands, F. J. Eyre, Jno. Whitaker, E. R. Vaughan, G. Nelson, J. Bowing, W. Wells, C. L. Cunningham, G. Jennings, G. Neuse, J. Wilson, F. Darkin, W. Chesterman.

Monthly Notices.

A Skeleton of a Mastodon has been found at Lisle, near Binghampton, New York, and is being exhumed for the museum of the Cornell University.

An Exhibition of Electrical Science and its Applications is proposed to be held in Paris, in 1877. An organizing committee has been formed, and provisional offices established.

The Lightning-rods of Paris in connection with the buildings of the municipality are to be reported upon by a commission appointed by the Prefect of the Seine. The commission comprises several members of the Academy, and they are to report annually.

The death of Mr. S. T. Davenport, well known as an active and energetic officer of the Society of Arts, took place on Friday, Jan. 7th, after an ilness of only four days. Mr. Davenport's connection with the Society has lasted for thirty-three years, and it was in great part to his unceasing and zealous efforts that the present prosperity of the society is due. To very many of the members he was well known, and all will regret his loss.

The Institution of Civil Engineers have appointed supplemental meetings on the following Friday evenings:—February the 4th, the 11th, and the 18th. The papers to be read on these evenings are, respectively, "Proposed Thermo-pneumatic Works," by Mr. A. D. Stevenson; "Rio Tinto Mines Tunnel," by Mr. G. B. Bruce, jun.; "Underpinning," by Mr. A. S. Moss; "Centrifugal Pumps," by the Hon. R. C. Parsons; and "Canal Navigation," by Mr. H. S. White. The chair will be taken at 7 o'clock on each evening, and successively by Mr. Siemens, Mr. Barlow, Sir J. Bazalgette, C.B., Mr. Bramwell, and Mr. Abernethy.

Rapid Deep Boring has recently been effected by the first bore-hole put down by a company formed to search for coal in Switzerland. A depth of 1,422 feet was reached in two months, including the re-boring of the upper 640 feet from 3½ to 7 inches in diameter. The work was done, including all delays, at a rate over 1,000 feet per month, the highest speed being nearly seventy-seven feet in twenty-four hours. The results obtained were negative, the section showing about 1,200 feet of Permian strata resting upon old crystalline rocks; but the trial is only the first of a series.

Action of Light upon solution of iodide of potassium and sugar, is stated by M. E. Durrwell, in the Bulletin de la Société de Paris, to be that it soon turns it yellow by the liberation of iodine. If starched papers are washed, in the dark, with this solution, they may be used as photographic papers, which, after exposure to light, need only be washed in plenty of water to render them insensible to luminous influence.

The Artisans' Institute, Castle-street, Leicester-square, is, we understand, progressing favourably. Lectures on various scientific and literary subjects being given, classes held for technical instruction, and educational arrangements of other kinds carried on thereat.

Duckham's Automatic Gas Light Regulators for Railway and Tram Carriages.—Mr. Duckham, who has for years past devoted much attention to this subject, has, we understand, just patented some important improvements, which are to be worked by a company now in course of formation at 36, Parliament-street, Westminster.

M. Boillot has been studying the action of ozone in retarding putrefaction. A piece of meat was put into a vessel containing air, and a similar piece into another vessel containing ozonized air. At the end of five days the meat in the ordinary air was in a high state of putrefaction, while that in the ozonized air remained quite fresh. At the end of ten days the conditions remained unchanged; but after that period the ozone appeared to lose its powers.

The Quarterly Journal of Science contains a paper by Camille Flammarion on "Sidereal Astronomy: Double Stars—Far-off Worlds," full of striking facts and daring hypotheses which must provoke thought.

The Ateneo Barcelonès offer a prize of £60, to be awarded in 1877, for the best essay on "The Importance of Metallurgical Industry to Spain, and Means for its Improvement." Communications in Spanish are to be sent to the Ateneo before April 30, 1877.

Proceedings of Societies.

ROYAL SOCIETY.

December 16th.—Dr. J. D. Hooker, C.B., President, in the chair.—The following papers were read:—"On the Development of the Spinal Nerves of Elasmobranch Fishes," by Mr. F. M. Balfour; "On the Structure and Development of the Skull of Batrachia, Part II.," by Mr. W. K. Parker; "Preliminary Observations on the Locomotor System of Medusæ," by Mr. G. J. Romanes; and "On the Placentation of Hyrax," by Prof. Turner (Edin.).

January 6th.—Dr. Hooker, C.B., President, in the chair.—The following papers were read:—"On the Expansion of Seawater by Heat," by Profs. T. E. Thorpe and A. W. Rücker,—"On the Action of Light on Tellurium," by Prof. W. G. Adams,—"On the Refraction of Sound by the Atmosphere," by Prof. O. Reynolds,—and "On the Length of the Spark from 600, 1200, 1800, and 2400 Chloride of Silver-rod Cells, and the Phenomena accompanying the Discharge of 5640 Cells," by Mr. W. De La Rue and Mr. H. Muller.

GEOGRAPHICAL SOCIETY.

January 10th.—Major-General Sir H. C. Rawlinson in the chair.—The following gentlemen were elected fellows:—Lieut.-Col. Baker, Lieut. G. Huntingford, Capt. J. P. Cheyne, Rev. G. T. Warner, Messrs. C. R. Congreve, G. Errington, F. W. Fox, H. B. Joyner, P. Rawson, and A. R. Young. The paper read was, "Letters from Lieut. V. L. Cameron, R.N., on his journey from Lake Tanganyika to the West Coast of Africa."

ZOOLOGICAL SOCIETY.

January 4th.—Prof. A. Newton, F.R.S., V.P., in the chair.—The Secretary read a report on the additions that had been made to the Society's menagerie during the month of December, and called particular attention to a Haast's Apteryx (*Apteryx haasii*) from New Zealand, presented by Baron F. von Mueller, C.M.Z.S., and a Night Parrot (*Stringops habroptilus*) from New Zealand, presented by Mr. T. E. Featherston. An extract was read from a letter addressed to the Secretary by Mr. George Brown, C.M.Z.S., dated Port Hunter, Duke of York Island, stating that he had shipped for the Society to the care of Dr. G. Bennett, of Sydney, two Cassowaries and some other birds from New Britain and Duke of York Island. A letter was read from Mr. R. Trimen, Curator of the South African Museum, Cape Town, containing some remarks on *Canis chama*. Dr. Hector, F.R.S., exhibited and made some remarks on three ancient Feather-mats, made by the Maoris of New Zealand, which had been obtained by Dr. Buller, from a Chief on the Upper Wanganui River. Prof. W. H. Flower, F.R.S., gave a description of the Skull of a fossil species of the genus *Xiphodon*, Cuvier, from a specimen belonging to the Museum of the Royal College of Surgeons, supposed to have been found near Woodbridge in Suffolk. Prof. Huxley, F.R.S., read a paper on *Ceratodus*, in which he pointed out the special characters presented by this remarkable fish in the structure of its nasal apertures, brain, skull, and fore-limb. Prof. Huxley also called attention to the close connection shown by certain details of structure between *Ceratodus* and the Chimæroid fishes, especially as regards the skull. A communication was read from Dr. Julius Von Haast, F.R,S., containing the description of a new Ziphoid Whale from the Coast of New Zealand. Mr. Sclater read a paper on some additional species of birds from St. Lucia, West Indies, which had been sent to him by the Rev. J. E. Semper of that island. The collection contained one very remarkable form, which appeared to be referable to a new genus of *Mniotiltidæ*, and was proposed to be called *Leucopeza semperi*. A communication was read from Mr. W. H. Hudson, C.M.Z.S., containing some notes on the Spoonbill of the Argentine Republic. A paper was read by Messrs. Sclater and Salvin, on Peruvian Birds collected by Mr. Whitely, being the ninth of a series of communications on this subject. A communication was read from Dr. Otto Finsch, containing notes on some Fijian Birds, including description of a new genus and species proposed to be called *Drymochæra badiceps*. Mr. A. H. Garrod, F.Z.S., read a note on the *cæcum coli* of the Capybara, as observed in a specimen recently deceased in the Society's Menagerie.

MICROSCOPICAL SOCIETY.

January 5th.—C. Brooke, Esq., President, in the chair. Numerous presents to the Society were announced and acknowledged, and three new Fellows were elected. Messrs. W. A. Bevington and B. D. Jackson were elected Auditors of the Society's accounts, and a list of gentlemen nominated for election as Officers and Council for the ensuing year was read by the Secretary. Attention was called to a number of specimens sent to the Society a short time since by Mr. Hanks, of San Francisco, and which had since been mounted for the cabinet by Mr. Loy; also to some slides of *Aulacodiscus Kittoni*, presented by Mr. Curties from material collected on the late Congo Expedition by Mr. Martin, H.M.S. Spiteful. Mr. Stewart gave an account of the structure and development of sponges, freely illustrating his remarks by drawings upon the blackboard, and concluding by stating his reasons for believing that the well-known perforation in oyster-sheels were really the work of sponges. Mr. Hickie exhibited some photographs from Germany of *Navicula crassinervis* and *Frustulia Saxonica*, and read letters from Dr. Rabenhorst and Herr Seibart in support of his opinion that the two were widely distinct. A discussion followed, in which Messrs. Hickie, Curties, and Mayall took part.

ENTOMOLOGICAL SOCIETY.

January 5th.—Sir S. Saunders, President, in the chair.—Messrs. F. J. Horniman and D. G. Rutherford were elected Ordinary Members, and Prof. W. Dickson and Mr. F. Enoch were elected Subscribers. The Rev. R. P. Murray exhibited a collection of Lepidoptera, taken by him on the Higher Alps, amongst which were some interesting mountain varieties. Mr. S. Stevens exhibited a specimen of a dragon-fly, rare in this country (*Æschnia mixta*), which he had picked up, nearly dead, in his garden at Upper Norwood, in the middle of November. Mr. Champion exhibited some rare British Coleoptera. Mr. W. H. Bates communicated a paper, entitled "Additions to the List of Geodephagous Coleoptera of Japan," with synonymic and other remarks. Mr. W. H. Miskin communicated a description of a new and remarkable species of moth belonging to the genus Attacus, of which a male and female specimen had been taken in the neighbourhood of Cape York. He had named the species *A. Hercules*. The expanse of the wings measured nine inches, and the hind wings were furnished with tails. The specimen had been deposited in the Queensland Museum. Mr. C. O. Waterhouse forwarded a paper "On Various New Genera and Species of Coleoptera," belonging to the Geodephaga, Necrophaga, Lamellicornia, and Rhyncophora.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

January 5th.—Mr. H. S. Cumming, V.P., in the chair.—Four associates were elected. Among the objects exhibited were two singular Asiatic daggers, very similar to the Andaces of mediæval Europe, shown by Mr. S. Cumming; also a lantern of white ware produced at the extinct Warrington manufactory, sent by Dr. Kendrick. The Rev. S. M. Mayhew exhibited a charming flagon of Flanders ware, procured at Stratford-on-Avon, and other objects of Elizabethan date. Mr. C. Brent exhibited some very early leaden tokens; and Mr. L. Brock described a large series of Abbey pieces, jettons, and counters, which he exhibited, some of which were of silver, the work of Simon de Pass. He showed, also, photographs of the large ancient vessel recently found in the Hamble by Mr. Crawshay, and announced that the Board of Trade had assented to Mr. Crawshay's investigations being resumed. Mr. T. Burgess described the researches now being carried on at the Saxon cemetery discovered near Warwick. A large collection of interesting objects, highly ornamented fibulæ of bronze and gilt, rings, umbones of shields, of iron long-swords, necklaces, &c., were shown, and pronounced to be of Pagan-Saxon date. The president, the Marquis of Hertford, exhibited for comparison the Ragley Park fibula found about forty years ago, and which is very similar. A paper, by the Rev. Prebendary Scarth, "On an Ancient Bell at Clapton in Gordano," was read by Mr. de Gray Birch.

METEOROLOGICAL SOCIETY.

December 15th.—Dr. R. J. Mann, President, in the chair.—Messrs. W. Ellis, K. J. Marks, T. Read, and P. Wright were elected fellows. The following papers were then read:—"On the Registration of Sunshine," by R. H. Scott. This paper is on the continuous record of sunshine and rainfall obtained at Kew for September, 1875; the latter by Beckley's Rainguage, the former by a method originally proposed by Mr. J. F. Campbell. This consists in the use of a sphere of glass to concentrate the sun's rays, and a strip of cardboard is placed on a frame concentric with the sphere, and distant from it by its own focal length. The sun, when it shines, burns a hole in the cardboard, the length of the trace being regulated by the duration of the sunshine. It remains to be proved whether such a record is of real practical value, as it affords no measure of the heat of the sun. "On the Rainfall at Calcutta," by Mr. R. Strachan. These observations were made at the office of the Surveyor General, and extend over a period of twenty-eight years, viz., from 1847 to 1874. The most rain falls in July; but the heaviest downfalls are most frequent in June, and heavy downfalls are more frequent in August than in July. The greatest number of days of rain is in July, but the number is almost the same for August. December has the least frequency and amount of rain. The dry season includes November to April, during which, on an average, 6·04 inches of rain fall, on 12 days out of 181, or 1 out of 15 days. The wet season is from May to October inclusive, during which 61·60 inches of rain fall, on 84 days out of 184, or about 1 in 2 days. There is, therefore, ten times as much rain in the wet season as in the dry, and nearly seven times as many rainy days. The mean annual rainfall is 67·64 inches in 96 days. "On the Use of the Rotary Thermometer (*Thermometre fronde*) on board ship," by Mr. R. H. Scott. This paper showed that the mean of seventy-six days' observations made by Capt. Heggum, of the Royelle, on a voyage from and to Calcutta only differed by -0°4 from the mean of the observations made in the ordinary way. "On the Moon's Influence in connexion with our Extremes of Temperature," by Mr. G. D. Brunham. Mr. Scott exhibited a complete set of instruments, with thermometer, &c., as used at the Russian meteorological stations.

ANTHROPOLOGICAL INSTITUTE.

December 14th.—Col. A. L. Fox, President, in the chair.—W. A. Jevons, Esq., was elected a Member.—Mr. M. J. Walhouse read a paper "On the Belief in Bhutas—

Devil and Ghost—Worship in Western India." Although the lower castes and classes in India acknowledge and reverence the Brahminical gods, their familiar household cultus is much more especially addressed to inferior supernatural beings, analogous to the evil spirits, devils, ghosts, and goblins of European superstition. According to Hindu doctrine, there are ten classes of such beings, the first seven of which are demons created aboriginally with the world, or by acts of the higher gods, on whom they wait as attendants or servants, receiving some share of their worship, and avenging any omission or neglect of ceremonies due. Though not individually, they are for the most part evilly disposed towards human kind. But the last three classes, of whom the paper more particularly treated, are exclusively of human origin, being malignant discontented individuals, wandering in an intermediate state between a heaven and a hell, intent upon mischief and annoyance to mortals, chiefly by means of possession and wicked inspiration, every aspect of which ancient ideas, as well as the old doctrine of transmigration, they exemplify and illustrate. They are known by the name of Bhuta. The author went on to show how most of the evils and misfortunes of life were attributable to the Bhuta influence; deaths from violence, evil possession, diseases in families and in cattle, stone-throwing, &c. He then described the priestly use of those supposed powers, the cure of diseases, the conduct of festivals and dances. It was also pointed out how close was the similarity between the occurrences under Bhuta influence and the prevalence of a belief among European nations in witchcraft, demoniacal possession, "levitations," ghosts, invisible powers, dancing manias, and the like. The Bhuta temples and ceremonies were also described and compared with those of the Todas and other Hill tribes. The paper contained accounts of several well-authenticated trials consequent on Bhuta interference and punishment. A series of Bhuta (Turanian) gods was exhibited by the author, as illustrative of the wide difference between Turanian and Aryan art. Mr. G. Napier read a paper, "On the Localities whence the Tin and Gold of the Ancients were Derived;" and a paper, by Mr. B. F. Hartshorne, "On the Weddas of Ceylon," was also read.

GEOLOGICAL SOCIETY.

DECEMBER 15TH.—J. Evans, Esq., President, in the chair.—Messrs. F. J. Bennett, A. A. Bourne, C. T. Clough, J. L. Cherry, W. H. Dalton, W. Saise, J. W. Szlumper, and L. H. G. Young were elected Fellows; and Prof. A. Quenstedt, of Tubingen, a Foreign Member of the Society.—The following communications were read: "Notes on the Physical Geology of East Anglia during the Glacial Period," by Mr. W. H. Penning; and "Denuding Agencies and Geological Deposition under the Flow of Ice and Water, with the Laws which regulate these actions, and the special bearing on river-action, of observations on the Mississippi and other great rivers, and their present and past Meteorological conditions, and similar remarks on Marine Deposits, illustrated by the Irish Sea and the Chesil Beach," by Mr. A. Taylor.

ROYAL SOCIETY OF LITERATURE.

DECEMBER 22ND.—S. G. Grady, Esq., in the chair.—Mr. Vaux read a paper "On the Origin and Derivation of the French Language," in which he called attention to a theory *revived* by M. Brachet in his "Historical Grammar of the French Language," to the effect that French and the other Roman languages were derived from a vulgar Latin, differing, in structure as well as vocabulary, from that of Cicero and Virgil. Mr. Vaux maintained that, admitting in Rome, as elsewhere, that there was an unpolished dialect spoken by the common people, there was no evidence to show that this popular dialect was, in any sense, a distinct language from Latin; the more so that abundant instances occur in the best writers of the use of many words supposed by M. Brachet and others to be especially the mark of a separate and independent language.

CHEMICAL SOCIETY.

DECEMBER 16TH.—Prof. Abel, President, in the chair.—Dr. C. R. A. Wright read a paper, by himself and Mr. G. H. Beckett, "On Narcotine Cotarnine and Hydrocotarnine, Part III., in which the authors brought forward experimental evidence of the constitutional formulæ for hemipinic acid, pianic acid, and meconin; Dr. H. E. Armstrong gave an account of researches, by Mr. Harrow and himself, "On the Action of Alkaline Sulphites on Haloid Derivatives of Phenol," and "On the Action of Nitric Acid on Tribromophenol;" Mr. E. Neison made a communication "On the Sebates of the Alcohol Series;" Papers were read by the Secretary, "On the Compounds of Ether with Anhydrous Metallic Chlorides, by Mr. P. P. Bedson; and "Observations on Variations in the Composition of River Waters," by Mr. J. Andrews.

PSYCHOLOGICAL SOCIETY.

DECEMBER 18TH.—Mr. Serjeant Cox, President, in the chair.—Capt. Garratt, Messrs. W. W. Fawcett, C. H. Strawbridge, S. Spalding, and H. Ullyett were elected members.—The adjourned discussion "On Materialism," in reference to Prof. Tyndall's paper, was resumed by Mr. G. Harris. Various Members took part in it, and it was again adjourned.

INSTITUTION OF CIVIL ENGINEERS.

DECEMBER 21ST.—Annual Meeting.—Mr. T. E. Harrison, President, in the chair.—The Report of the Council was read.—After the reading of the Report, the Premiums awarded were presented as follows:—Telford Medals and Premiums to Messrs. W. Hackney, H. E. Jones, A. R. Binnie, and G. F. Deacon; a Watt Medal and the Manby Premium to Mr. J. C. Hawkshaw; and Telford Premiums to M. J. Gaudard, Prof. Prestwich, Messrs. J. T. Smith, C. Colson, and T. C. Watson; also the Miller Prizes, adjudged to Messrs. A. E. Baldwin, J. C. Inglis, W. B. Myers, A. S. Moss, W. P. Orchard, J. Tysoe, and J. C. Mackay.—The following gentlemen were elected as officers for the ensuing year: G. R. Stephenson, President; J. Abernethy, Sir W. G. Armstrong, W. H. Barlow, and J. F. Bateman, Vice-Presidents; Sir J. W. Bazalgette, I. L. Bell, G. Berkley, F. J. Bramwell, G. B. Bruce, J. Brunlees, Sir J. Coode H. Hayter, W. Pole, C. W. Siemens, Sir J. Whitworth, Bart., and E Woods, Members; and T. Brassey, D. Galton, and J. W. Pease, Associates.

January 11th.—Mr. G. R. Stephenson delivered an address, on taking the chair for the first time after his election as President. In this address Mr. Stephenson advocated the separation of goods and mineral trains from passenger trains on all crowded main lines of railway; he insisted on the necessity for the construction of harbours of refuge on the east coast of England; he alluded to the improvements which had been effected in marine engines during the last thirty-six years; and he dwelt upon the loss of steam-vessels at sea, and contended that, having regard to the great length of mercantile steamers in proportion to their breadth, the engine-room combings should be considerably raised, the engine-room skylights should be protected with iron Venetian shutters for the canvas to rest upon, the size and height of the ventilators should be materially increased, and all the sea-cocks should be in view accessible, when fewer steam-ships would founder at sea. Lastly, he referred to the mutual relations of capital and labour, and to the disturbed condition of what was called "the Labour Market."—Eleven Candidates were elected Associates, viz., Messrs. F. A. Abel, R. E. Brounger, E. A. Dunn, M. W. B. Ffolkes, A. H. Hime, A. Mead, J. H. Morant, O. Reichenbach, E. E. Sawyer, J. H. Smith, and F. Vigers.

KRUPP'S SILICATE COTTON BOILER COATING.

CRESSWELL & Co., of 140, Leadenhall-street, who are the agents for Herr Krupp, state the advantages of the silicate cotton over any boiler coating hitherto used to be so great, that it is actually the cheapest article ever used for this purpose, and they add:—

Its extremely light weight on boilers, its incombustibility (which is proved by the fact that it can be placed in a glowing fire until red hot without the slightest effect being produced upon it), and the resistance it gives to any other destructive power, make it an article which will soon become indispensable. Indeed, many large firms have already stripped the old coating from their boilers and substituted Krupp's.

Some of the coatings hitherto used, though reputed to have answered well at first, have all more or less shown a strong tendency to char after a time, and consequently lost their non-conducting power; while many coatings have soon cracked and peeled off, especially on marine boilers, owing to the vibration. Some, again, are of such a nature that it is impossible to detect a leak.

All these difficulties are said to be successfully overcome by Mr. Krupp's invention, and it will doubtless be observed, from the mode of application, that it is at once simple and effective.

The quickness of applying the silicate cotton is an immense advantage in the case of steamships, which frequently stay but a very short time in port, and by having the mattresses previously prepared according to requisite size, the boilers of the largest vessels afloat could easily be coated in a single night.

Marine engineers, it appears, show a strong preference for this coating also, because it does not rot or fall off in consequence of the sea constantly coming through the skylights and washing over the boilers.

BRIGHTON SEWERAGE.

BY J. G. GAMBLE, B.A., ASSOC. INST. C.E.

THE area affected by the Brighton Outfall Sewers is about 1,800 acres, and comprised the whole of what was ordinarily called Brighton. Portions also of the parish o Rottingdean, east of Brighton, might be drained into the intercepting sewer. The range of tide varied from 22 feet to 9 feet. The geological formations were the "upper chalk," or "chalk with flints," with overlying strata westward, and in the valleys chiefly of fine sand. Towards the west end of Brighton a stratum of clay was found near the surface.

Until about thirty years ago, the sewage of Brighton was drained into cesspools. Such sewers as there were chiefly served to convey away rain water to the upper part of the beach. When, however, the houses were drained into the sewers, the sewers became a great nuisance, and were gradually extended farther and farther seaward. In 1870, at the time of passing of the Act for the present works, there were eight outfalls, all of which, with one exception, were abolished, the sewage passing to the outfall at Portobello.

To remedy the evil Mr. Hawksley, Past President Inst. C.E., proposed still further to lengthen the pipes. Mr. Robert Rawlinson, C.B., M. Inst. C.E., suggested an intercepting sewer, with an outfall to the westward of the town. Sir Joseph Bazalgette, C.B., M. Inst. C.E., recommended an intercepting sewer, with an outfall to the eastward, near Roedean Gate. Messrs. Maclean and Wright also proposed that the sewage should be taken in the same direction, but placed the outfall at Saltdean. The present position, Portobello, was recommended by Sir John Hawkshaw, Past-President Inst. C.E., who designed and carried out the whole of the work, the Author being the Resident Engineer. Mr. Matthew Jennings originally took the contract for the works, but they were finished by Messrs. John Aird and Sons.

The intercepting sewer began at Hove Street, ran under the Shoreham Road nearly to the end of the Brunswick Square Lawns, passed under the beach till it entered again under the road at East Street, and excepting for a short distance at Rottingdean, it extended from thence under the Marine Parade and the Newhaven Road to Portobello. The sewer was of brickwork, and was of a circular section, 5 feet in diameter up to East Street; 6 feet in diameter between East Street and the Steyne; 7 feet in diameter from the Steyne to the Penstock Chamber, Portobello; and between the Penstock Chamber and the sea, the sewer was partly of brickwork, partly of three cast-iron pipes, 4 feet in diameter, laid side by side; the total distance was 38,590 feet, or, 7¼ miles. The average fall was about 3 feet in the mile.

The invert at Hove-street was 21 ft. 6 in. above low water of spring tides; at the Steyne, 15 ft. 3 in.; at Blackrock, 14 ft. 3 in.; and at the Penstock Chamber, 2 ft. above low water of spring tides.

Besides the main line a considerable length of junction sewers was constructed to connect the old main sewer by suitable curves. Catch-tanks were inserted in the tributary sewers just before their junction with the main sewer. These catch-tanks were of different dimensions, according to the quantity of material expected. The tank at the Steyne was 40 feet long, and 18 feet broad. The deposit was almost entirely road drift, and as it mainly came in after storms, it was very little contaminated by sewage. All these tanks, as well as the bell-mouth chambers, were ventilated by shafts to the road. There were twenty-four side entrances, including the Penstock Chamber. Besides these, nine of the ventilators had hand and foot irons built into them; four of these had entrances from the beach, as well as winding staircases to the road. When the entrance was double, the main shaft was generally used as a working shaft during progress—the passage to the beach, the manhole on the footway, and the ventilating passage communicating with a grate in the centre of the road. Besides the thirty-three entrance shafts, there were twenty-eight smaller shafts, only intended for ventilation. Where the sewer was under the roadway, the gratings were not directly over the sewer, but a small pit was interposed to catch pebbles and dirt. The grates were of cast iron, in two parts. The interior portion could be lifted out without disturbing the outer one or the road metalling. The circular shafts were connected to the springing of the sewer by walls battering inwards, and starting from the springing of the sewer. When the surface was at a considerable height above the sewer, the ventilators at the lower end of the sewer had irons let into the walls to enable the flushers to get out. Where very deep they had in addition a special recess, considerably above the level of the storm overflows, as a refuge for flushers.

There were three storm overflows in Brighton, at the former western, central, and eastern outfalls respectively. In the six months ending the 21st of December, 1874, the central overflow had come into operation three times, and the other two once. In the first six months of 1875 the storm overflow only came into operation once. In that at the Steyne a weir was built in a slanting direction across the old sewer, and the ordinary drainage passed along a new sewer towards its junction with the intercepting sewer. The level of the top of this weir was about 2 inches higher than the old storm overflow, a level found sufficient to prevent the floating of the lowest basements in case of the weter getting past the house-drain flaps, and backing-up the house-drains. The storm water was discharged by the former central outfall. An inlet had been constructed at the Steyne with pen stocks to admit sea-water to flush the lower part of the sewer; this was generally used at spring tides. Arrangements had also been made for working two sets of penstocks, one by which the tide should be shut out in case of the valves not acting, the other for penning back the sewage temporarily, so as to flush the outfall at low water. The chamber was provided with a passage to the beach, and with a louvred roof for ventilation. Between the penstock and the sea, the section of the sewer changed from a circle to a semicircular arch with a flat invert, and then again, by an arched chamber, to three iron pipes. The iron pipes were held together in a frame of green-heart timber, with wrought-iron bolts, and the pipes were retained in line by bolts which passed through lugs cast on them for that purpose. Beyond the mouth of the pipes the sewage ran in a trench only visible at low water during spring tides.

The progress of the work, and the method of laying out the line of sewer were next described. The works were begun in January, 1871, and were completed in June, 1874. Between Hove Street and the Steyne, a length of 2 miles, the sewer was built in an open cutting, while between the Steyne and Portobello, a length of over 5 miles, it was tunnelled through chalk. The brickwork was 9 inches thick, except between Rottingdean and the Penstock Chamber where it was 13½ inches thick, and between the Penstock Chamber and the sea it was 18 inches. All this brickwork was set in Portland-cement mortar, with the exception of the walls of the Penstock Chamber, which were in greystone lime mortar. Gault pressed bricks, or bricks made at St. John's Common, near Burgess Hill, were used in the inverts, and ordinary Gault or stock bricks in the arches. The bricklayers were paid 10s. for each 12-feet length of 9-inch work, and 15s. for each 12-feet length of 13½-inch work. Brick blocks of eight whole bricks and four half bricks were used when the bottom was wet. Radial bricks were not required owing to the large diameter of the sewers. More than six million bricks were used—sixty-three courses being required in the inner ring of the 5-feet sewer, and eighty-six courses in the 400 lineal feet of brickwork in tunnelling were executed per 7-feet sewer. Pipes were laid under the invert to carry off the water, much of which was met with while the brickwork was being put in. When the junction was made between the brickwork from one shaft with that from the next, the pipes were plugged or closed by a valve built for that purpose. Under the sills at Portobello iron pipes were used, which were afterwards filled with Portland-cement grout. So great was the pumping, that the wells at Rottingdean and at the Coastguard station at Portobello were seriously affected. For a considerable period 15,000,000 gallons of water were pumped every twenty-four hours, the water in most cases being raised about 30 feet. At this time thirteen pumps about 20 inches in diameter were employed, worked by one 50 h-p. stationary engine, and eight portable engines averaging 14 h-p. each. The water gave considerable trouble in setting the brickwork.

The ventilation of the sewer during the progress of the works was good in every portion where there were two openings. Where there was only one opening the air in the heading became bad, and openings to the cliff had frequently to be made.

The total cost of the work had been about £100,000. The cost of a lineal foot of the 5-feet sewer, which was built almost entirely under the first contract and in open cutting, was 29s. The cost per lineal foot of the 7-feet sewer, 9-inch work, which was done by tunnelling, was 27s. under the first contract, 41s. under the second. The extra cost of 3-ring work (13½-inches) over 2-ring work (9-inches) was, under the first contract, 12s., under the second 16s. per lineal foot. The cost of a ventilator varied from £20 where the sewer, as at Cliftonville, was not far from the surface, to £160 where the ground level was, as at some places on the Newhaven Road, from 150 feet to 160 feet above the invert. The staff now employed under the Brighton Town Surveyor on these works was one inspector and six flushers, including two men at Portobello to take care of the penstocks.

[The foregoing is a summary of a Paper read by Mr. Gamble at a recent Meeting of the Institution of Civil Engineers.]

LIFEBOAT SERVICES IN 1875.

During the year which has just closed the lifeboats of the National Lifeboat Institution have rendered the following services on different parts of the coasts of the United Kingdom. The recent unusually severe storms have tested to the utmost the qualities of the institution's large life-saving fleet; but on every occasion both the brave men and their boats have been found fully equal to every emergency, and the result has been the saving of scores of shipwrecked sailors:—Schooner Fanny, of Salcombe, 7 lives saved; schooner Mary Tatham, of Beaumaris, 4; barque Britannia, of North Shields, 14; ketch Queen Victoria, of Lynn, 3; schooners Amity, of Beaumaris, and Tantivy, of Falmouth, rendered assistance; barque Lizzie Bovill, of Newcastle, assisted to save vessel and crew, 9; brig Pike, of Shoreham, 7; barque Anna, of Bremen, 16; ships Lord Strathnairn, of Liverpool, and Oriental, of North Shields, assisted to save vessels; schooner Hannah, of Liverpool, 2; schooner Arrow Belle, of Aberystwyth, 4; barque Margaret Evans, of Glasgow, 21; barque Toronto, of Glasgow, 11; barque Blanche Marguerite, 10; schooner Zouave, of Portsmouth, 6; brig Lisbon, of London, 2; s.s. Shotton, of West Hartlepool, saved vessel and crew, 18; schooner Lydney Trader, of Barnstaple, 3; ship Edward O'Brien, of St. Thomas, U.S., 5; smack Britannia, of Belfast, 3; flat Hester, of Conway, 2; schooner Ward Jackson, of Carnarvon, 5; schooner Tantivy, of Wicklow, 4; ship China, of South Shields, assisted to save vessel and crew, 22; brigantine Ida, of Dundalk, 7; schooner Jessie Brown, of Yarmouth, assisted to save vessel and crew, 5; schooner Friends, of Killyleigh, 4; sloop Osprey, of Shields, 2; fishing coble Rosanna, of South Shields, saved coble and crew, 3; schooner Punch, of Carnarvon, 6; schooner Cairnduna, of Thurso, 4; brig Thirteen, of Sunderland, 8; s.s. Tuskar, of Glasgow, 21; schooner Augusta Louise, of Nantes, and ship Ernestine, of Amsterdam, assisted to save vessels; yacht Cruiskeen Lawn, of Wexford, 2; steam tug Vixen, of North Shields, assisted to save vessel and crew, 8; cutter Harkaway, of Yarmouth, 6; brig Shields, of Cork, 3; sloop Richard and Elizabeth, of Portsmouth, assisted to save vessel and crew, 4; schooner Villager, of Inverness, 5; sloop Helen, of Stornoway, 2; brig Belfast, of Rochelle, assisted to save vessel and crew 9; smacks Invincible, of Port Elsie, Tippergraph, of Scarborough, and James, of Mandel, 12; barque Lucy, of Antwerp, and brigantine Florence, of Annapolis, assisted to save vessels; ship Ellen Southard, of Richmond, U.S., 19; brigantine Immacolata, of Naples, 8; smacks Native, of Peel, and Sophia, of Hull, assisted to save vessel and crews, 7; steamer Montagu, of Liverpool, 33; brigantine Paquet de Terra Nova, 10; schooner Cathrina, of Riga, 8; barque Bucephalus, of Shields, assisted to save vessel and crew, 20; schooner Lucinde, of Whitstable, 6; barque Teazer, of Whitby, 9; fishing-boat Mary Ann, of Scarborough, saved boat and crew, 9; barque Young England, of Middlesborough, 4; schooner Leopold, of Riga, 6; Russian schooner Emilia, saved vessel and crew, 9; lugger Gleaner, of Sheringham, 2; brig Vidar, of Drammen, 8; brig Cuba, of Abo, saved vessel and crew, 8; schooner Elizabeth, of Carlisle, 3; schooner Sensitive, of Boulogne, rendered assistance; schooner Auld Reekie, of Middlesbro, 8; s.s. Altona, of Hamburg, 14; Swedish barque Svadsfare, saved vessel and crew, 16; brigantine Porthan, of Aland, 9; steamer Britannia, of Leith, 35; barque Monte Carmelo, of Malta, assisted to save vessel and crew, 13; schooner, Saucy Jack, of Yarmouth, 4; schooner, Harmston, of Newcastle, 7; schooner, Josie, of New York, assisted to save vessel and crew, 8; brig Marie Josephine, of Cherbourg, 4; brigantine Waterloo, of Cork, 7; brig Wish, of Plymouth, and ship Queen of India, of Liverpool, rendered assistance; brig Emily Raymond, of St. John's, N.B., 9; cutter Alice, of Yarmouth, assisted to save vessel and crew, 6; schooner Elinor and Mary, of Milford, 3; smack Laura, of Carnarvon, 4; schooner Fortuna, of Nykjobing, Denmark, assisted to save vessel and crew, 5; schooner Independence, of Carnarvon, 4; schooner Princess Royal, of Cardigan, 5; barque Fleetwing, of Newcastle, assisted to save vessel and crew, 9; schooner Nathalia Jacobine, of Nibe, Jutland, 4; barques Broughton, of Liverpool, and Norma, of Grimstadt, and schooner Ellen Beatrice, of Aberystwyth, rendered assistance; brig Vittorioso G., of Venice, 9; schooner Henrietta of Truro, assisted to save vessel and crew, 5; smack, Mermaid of Grimsby, 1; schooner Johanna Antoinette, of Gravanghage, 5; brig Brodrenes Haab, of Tonsberg, and barque Caseo, of Bargo, assisted to save vessels and crews, 21; sloop Lauton, of Arbroath, 2; barge Star, of Colchester, 3; schooner Lass o'Doon, of Montrose, 35; fishing-boat of Teignmouth, 2; smack Thistle, of Castletown, 3; and brig Island Belle, of Guernsey, 7. This long list shows a total of 725 lives rescued by the society's lifeboats during the year, in addition to 29 vessels saved from destruction. In the same period the Lifeboat Institution granted rewards for saving 195 lives by fishing and other boats, making a grand total of 920 lives saved last year, mainly through its instrumentality. Altogether, since its formation the society has contributed to the saving of 23,786 shipwrecked persons, for which services it has granted 950 gold and silver medals, besides pecuniary rewards to the amount of £47,170. The character of these noble lifeboat services has varied much, some having been performed during the darkness of the night, others in the daytime; but nearly all have been rendered during stormy weather, which would have prevented any ordinary open boat from accomplishing the rescue. Indeed so numerous have the lifeboats of the institution become now, that hardly any open boats put off to the rescue of shipwrecked sailors; and in this way alone it saves indirectly every year many lives; for it often happened formerly that the crews of these open boats perished themselves in their noble enterprise, Again, it is most gratifying and encouraging to know that, notwithstanding the peril and exposure incurred by the gallant crews last year, only one life was lost from the 252 lifeboats of the society, although about 11,000 men were out in them on all occasions during the twelve months. We feel assured that an institution so truly national and benevolent in its character will maintain its firm hold on British sympathy and support; and that while it continues to pursue its course of usefulness with unabated vigour, the support and appreciation of the public will be proportionately liberal.

WATERPROOF CLOTHING.

No one has greater respect for indiarubber than I have. It is one of the most useful discoveries of the age in a thousand ways. But I must raise my voice against the habit of wearing indiarubber garments. The only healthy waterproofs are those of cloth treated in a way which, while rendering them almost impervious to rain, still admits of the escape of the insensible perspiration. The only situation in which indiarubber coats or cloaks can be tolerated is in riding or driving in the rain. Or they may be taken over the arm on a summer's ramble in the country, and worn only during a shower, and taken off at once. As dust-coats they are worse than useless. I wonder how many deaths a year in these islands might be attributed to the wearing of these nasty indiarubber coats and cloaks? One wears an indiarubber garment to keep out the rain, and in this he succeeds, but he also succeeds in thoroughly damping his clothes with perspiration. Better for him if he had got wet to the skin with rain, because he would then have felt bound to change his dress. As it is, he merely takes off his mackintosh and sits down, perhaps in a warm room, or a draughty railway carriage. And his damp clothes act in precisely the same way that a wet rag round a jar of water on a summer day does—they cool the contents. And as in this case the contents happen to be a human form divine, subject to a thousand and odd ills, what marvel that evil should result?—*From "Winter Clothing and Winter Comfort," in "Cassell's Family Magazine"* for January.

PAPER QUILTS.

I CANNOT conclude this article without just one word on the use of paper quilts. They obviate the use of too large a weight of blankets and bed-clothes, which in itself often banishes sleep. I do not know whether they are sold anywhere, but they ought to be. They would indeed be a boon to the poor. They ought to be made of any sort of thickish tough paper, and sewn on to a common bed-quilt, or better still, use them as we did in Greenland. We always sewed them between two blankets, and found them invaluable. "'Deed, indeed, your 'anar," said an Irish shipmate of mine, who had been round Spitzbergen way, in the Perseverance (of Peterhead), "cowd wasn't any name for it. If it hadn't been for a paper blanket, I believe, sur, I'd have died *iviry blissed night av my life."—From "Winter Clothing and Winter Comfort," in "Cassell's Family Magazine,"* for January.

TYRANNY OF FASHION.

THERE was a time when only one fashion, one shape, one colour, and one material came out at the beginning of winter and the beginning of summer. Those were the "good old times" of milliners and dressmakers, for no one then thought of being dressed differently to anyone else. Everyone, on the contrary, wore the same fashion, adapted in material to each lady's means. Now we change the fashions onch a month. The change is not great, it is true; still, there is a change, however slight it may be, and you would be surprised how profitable to the inventor is the very smallest change in any portion of a lady's wardrobe. I heard the other day that a well-known Paris staymaker had made a gigantic fortune merely by introducing an extra lace hole at the waist of her stays. That one little extra lacing drew in the waist a half centimetre tighter. That was quite sufficient to ensure Madame de V——'s success. She has now country houses, carriages, horses, &c., at her command.—*From the "Ladies' Treasury."*

A REAL PATRON OF ART.

ON the north side of Pall Mall, a little to the east of St. James's-street, stood formerly the Shakespeare Gallery, the creation of that real and true patron of art, and especially of historical painting and engraving, Alderman Boydell, whose name is far less well known than it deserves to be among artists and men of taste. Beginning life as an engraver, he spent a larger sum than any nobleman had done up to that time in encouraging a British School of engraving; for, as he tells us in one of his appeals, "when he commenced business nearly all the fine engravings sold in England were imported from abroad, and more especially from France." The outbreak of the French Revolution seriously embarrassed his venture in this artistic business, and in 1789 he was obliged to make arrangements for disposing of his Gallery. He brought out, however, a costly edition of the works of Shakespeare, the profits of which, together with a Shakespearian lottery, saved him from bankruptcy. After his death, however, the Gallery was for some years vacant, and Malcolm in 1807 speaks of it as "a melancholy memento of the irretrievable ruin of the arts in England."—*From Cassell's "Old and New London" for January.*

SAFETY APPARATUS FOR MINERAL OIL BURNERS.

WITH reference to the lamentable fate of the Goliath, our contemporaries, having a due regard for the interests of one of our principal and most prosperous industries, "The Mineral Oil Trade," very properly and justly attribute the disaster not so much to the flashing point of the oil as to the faulty construction of lamps which, burning mineral oils, become dangerously heated. We agree with our contemporaries in deploring that a cold lamp to burn mineral oil has not been "hit upon" by our lamp manufacturers. We have seen a system, invented by Col. Martin, applied to several railway lamps, and if the experiment of placing tissue paper, with gunpowder, on the top of the funnel of a lighted lamp for a considerable time, without the explosion of the powder, or scorch or trace of smoke on the paper, be a satisfactory test for the coolness of the lamp, we predict for the invention a universal success.—*Surrey Advertiser.*

THE INSTITUTION OF CIVIL ENGINEERS.—The official year of this Incorporated Society has just closed. In the past twelve months there has been an effective addition of 36 members, 131 Associates, and 50 Students. The number of the three classes now composing the Corporation are, 828 members, 1,454 Associates and 15 Honorary members, with a class of Students attached numbering 332, making a total of all grades of 2,629 as against 2,412 at the same date last year.

APPLICATIONS FOR LETTERS PATENT.

(*Continued from page* 18).

On December 14th.—4326 to 4337.—J. H. T. Ellerbeck and J. M. Syers. Production of motive power and apparatus therefor.—J. G. Tongue. Clothes-horses and other folding frames (com.)—J. Thompson. Method of mashing malt or grain.—T. Brown. Material for packing stuffing-boxes (com.)—G. Clark. Skates.—T. Rowan. Treating or purifying sugar.—G. J. Booth. Leather driving bands, and the machinery employed in the manufacture thereof.—M. A. Pradier. Method of fastening and unfastening the shirt, collar, or other stud, sleeve-link, and solitaire, by means of the screw principle.—P. Gamboni. Additions to motive-power machines.—F. J. Cleaver. Soaps, pomades, cosmetics, &c.—R. F. Donisthorpe and T. A. W. Clarke. Manufacture of craped or crimped hair.—E. Payne. Cartridge for charging tobacco pipes.

On December 15th.—4338 to 4353.—W. Morgan-Brown. Grain-cleaning apparatus, applicable to thrashing machines, and partly to grain-cleaning machines only (com.) (Complete specification.)—A. R. Allwood. Sewing machine needles.—H. G. Youard. Apparatus for cutting and pasting paper.—W. Morgan-Brown. Filtering reservoir (com.)—E. P. Alexander. Gas motive-power engines and the means for regulating and transmitting their motion (com.)—W. J. Coe. Spring safety valves.—K. T. Sutherland. Construction of handles for brushes used for domestic and other purposes.—A. M. Clark. Recoil check for fire-arms (com.)—J. Shaw. Velocipedes.—B. Barnard. Apparatus for opening and closing sliding windows, shutters, and doors.—H. Deacon. Manufacture of sulphuric acid.—P. D. Hedderick. Roller skate.—J. Clayton and T. Richmond. Looms for weaving.—G. Jeffries. "Top-levers" for breech-loading fire-arms.—H. Grauel. Stoppers for bottles.—A. Anderson. Shuttles for sewing machines.

On December 16th.—4354 to 4369.—W. Major. Preventing what is known as priming in steam boilers, and also preventing the interior of such boilers from becoming incrusted with the saline and earthy parts of the water used to generate steam therein.—C. Saunders. Fountain pen. G. Dingley, jun., and W. Ackers. Winning or getting coal, and apparatus or appliances therefor.—G. Gros. "Steel" for striking fire in order to light pipes, cigars, and cigarettes.—W. Saul. Tap or bottle cap.—E. Steele. Pitch chains for transmitting motion.—T. T. Pearson and D. T. Pearson. Manufacture of bed quilts, quilted petticoats, and other padded articles.—J. G. K. Burt. Apparatus for utilizing fuel for heating purposes.—F. W. Colls. Manufacture of gas for heating and lighting, and apparatus to be employed therein.—R. Henderson. Arrangements combining together various mathematical or philosophical instruments.—A. Armstrong. Safety cages for mine shafts.—D. M. Campbell. Construction of ships, with the view of saving life during shipwreck or other casualty at sea.—J. Imray. Treatment of meat for its preservation and preparation as food (com.)—F. Müller. Keyless watches (com.)—J. L. Ryland. Jars, bottles, and other vessels used for containing or transporting oils, varnishes, spirits, and other like fluids.—H. E. Newton. Furnaces for roasting metallic ores (com.)

On December 17th.—4370 to 4385.—R. Millar. Tramway cars.—H. Grünbaum. Apparatus for wiring and binding hat and bonnet shapes.—H. P. Dunbar and T. C. Lothrop. Manufacture of articles from vulcanised rubber. (Complete specification.)—F. Bolton. Apparatus for weighing and for measuring liquids.—H. A. T. Ehrhardt. Means for securing flange and other joints, also applicable for joints of driving-bands and the like.—H. J. Haddon. Lace or cord fasteners (com.)—T. Wrigley. Machinery or apparatus for spinning and doubling cotton and other fibrous substances. —T. C. Fidler. Steam boilers for tramway engines and other motive power.—R. Parker. Ventilating and purifying sewers and apparatus to be employed for those purposes.—J. H. Johnson. Steam engine indicators (com.)—H. Halladay. Brace fittings.—R. Baillie. Cranes.—A. Martin. Apparatus for clipping or shearing animals.—H. La Fors. Arrangement of the wheels, axles, and apparatus connected therewith, of road locomotives and traction engines.—W. Smith. Joining telegraph wires.—I. Loeser. Processes for destroying noxious insects or vermin by means of gases and vapours issued from certain substances.

On December 18th.—4386 to 4405.—W. E. Newton. Printing machinery (com.)—G. Browning. Sewing machines.—R. Morgan. Smoke consuming furnaces.—E. B. Ellington. Apparatus for raising or hauling weights.—W. Adams and J. Livesey. Rolling stock of railways and tramways.—M. Prentice. Apparatus for concentrating sulphuric acid, saline, and other solutions.—M. Prentice. Construction of platinum vessels exposed to heat or strain.—F. Dresser. Cements.—G. E. Collette. Method of constructing "rollers" or "castors."—A. Fryer and J. B. Alliott. Construction of vacuum pans, and the construction of and mode of driving vacuum pumps to be employed therewith, partly applicable to other pumps.—E. Taylor. Construction of stoves for heating laundry irons, and utilizing the waste heat from such stoves for drying and airing purposes. W. Wright. Roller skates.—E. Lawrence. Apparatus for cutting, drilling, engraving, or carving metals and other materials.—W. Shaw, jun., and W. Hutchinson. Manufacture of cast, forged, and rolled steel.—F. E. Duckham. Discharging mud or "spoil" from dredgers and other vessels.—J. Steel. Charging and drawing retorts and machinery or apparatus employed therefor, and means of opening and closing retorts.—B. Harlow. Apparatus for moulding pipes, elbows, and other similar articles.—R. Quin. Opening and closing arrangements applicable to cases for containing jewellery, plate, papers, pictures, and other articles.—W. L. Hunt. Apparatus to be employed in theatrical or gymnastic performances.—H. Jewitt. Slate desk (com.)

On December 20th. — 4406 to 4415. — J. T. King. Lock washers for screwed bolts and nuts. — E. J. van de Velde. Adherent cigar holder. — F. A. Cowell. Kilns or furnaces.—F. A. Cowell. Non-porous and vitrified blocks, bricks, and other articles for various purposes.—S. Jackson, R. P. Kay, N. Dearnley, and T. Stafford. Apparatus for changing the shuttles in looms for weaving.—J. G. Chapman. Sugar cane mills.—J. Gamgee. Formation and maintenance of skating rinks. E. B. Lamb. Roller skates.—S. Godfrey and R. Howson. Gas furnaces.—J. H. Johnson. Rotating puddling vessels (com.)

On December 21st.—4416 to 4429.—S. G. Lutwyche. Saddles (com.)—E. A. J. Goldschmid, O. Horkheimer, and J. Farran. Apparatus for cutting or severing velvets and other piled fabrics.—H. B. Barlow. Filters (com.)—W. Wright. Water and steam boilers and their furnaces.—H. M. Ramsay. Filters, and mode and means for effecting the filtration and purification of clear sewage, river, or other water or liquids.—J. N. Pedder. Mode of heating smoothing irons, mangles, or other apparatus for pressing articles of apparel, textile and other fabrics.—T. A. Warrington and C. Harwood. Apparatus or valve suitable for cleaning or filling bottles, and for other purposes.—J. Parkinson. Treatment of ores. — L. von Wojewodsky. Means for facilitating the transit of wheel carriages on roads.—A. M. Clark. Safety apparatus for mine cages and other elevators (com.)—A. M. Clark. Autographic or copying telegraphs (com.)—W. T. Sugg. Apparatus for maintaining the proper water level in station gas meters (com.)—W. T. Sugg. Station and test gas meters.—W. R. Lake. Beaters for cotton openers (com.)

On December 22nd.—4430 to 4462.—H. Dansey. Marine boilers for using the outside shell as heating surface.—J. Ledger. Mode of separating postage and other stamps, and apparatus to be used for that purpose (com.)—P. Harris. Closing and fastening boots, and means or apparatus employed therefor.—J. Armstrong, W. Dean, and J. Holden. Arrangement and application of "bogie" and similar apparatus to locomotive engines and other railway rolling stock.—J. Webster. Clinical thermometers.—E. Lawrence. Apparatus for controlling the application of brake power.—E. Lawrence. Fixing railway and such like bolts or spikes.—W. B. Robins. Lamps.—A. M. Clark. Stoppering bottles, jars, and other vessels (com.) (Complete specification.)—W. H. Kent. Machinery or apparatus for cleaning and polishing boots and shoes.—J. Davie. Steam engines, and surface condensers for the same, and applicable otherwise.—W. Cunningham. Cooling warm water for use in condensing steam.—J. Chadwick. Covering drawing rollers used in machinery for preparing and spinning cotton and other fibrous substances.—T. Vicars, sen., T. Vicars, jun., and J. Smith. Self-stoking furnaces.—J. Ducournau. Manufacture and employment of cements and limes.—E. T. Hughes. Treating certain metallic alloys for imparting resonance thereto (com.)—G. A. Farini. Apparatus to be employed in theatrical or gymnastic performances.—G. F. Smeeton and J. Law. Apparatus for signalling between passengers, guards, and engine drivers of railway trains.—J. Watkins. Skates.—T. Brown and A. Beard, jun. Machinery for the manufacture of railway and other wheels, and other like articles.—J. Britten. Apparatus for checking receipts for money.—T. C. Stone. Kilns or ovens, and method of heating same for burning bricks and other like substances.—J. Kelly. Railway points or switches, and mechanism for actuating and locking the same.—R. Burton and A. Greig. Implements for tilling land.—W. Kempe and A. Kempe. Raising the nap upon cloths and fabrics, and apparatus employed therein.—A. Helwig and P. E. Cox. Implement for opening sheet-metal cans, cases, or boxes.—W. R. Lake. Journal box bearings or linings (com.)—J. Parkes. Candlesticks.—R. Hodson. Rotary engines.—J. Martin. Flower pots, vases, seed pans, and fern stands.—A. Mullord. Satining or impregnating with certain substances tissue and other paper.—A. M. Clark. Portable or table fountains (com.)—W. R. Lake. Vegetable parchment and process for making the same (com.)

On December 23rd.—4463 to 4479.—J. H. Gray. Reeds for weaving.—E. G. Brewer. Machines for the manufacture of bricks and tiles (com.)—A. B. Childs. Machinery for cleaning grain, rice, or seeds, or bolting flour, and separating and purifying middlings therefrom.—E. R. Vaughan. Pumps used in the manufacture of aërated waters.—P. Harris. Protector for the neck and chest from cold.—J. Hall. Fire-extinguishers.—W. Cooke and D. Mylchreest. Steam generators. — C. Harrison. Skates, partly applicable to sledges.—E. Thackray. Preparing, gilling, and drawing boxes.—W. G. N. Manley. Ambulance wheeled litter.—J. Nunn and S. Tuddenham. Skates.—J. L. Petingale. Proportional admixture and better method of putting up and administering certain digestive principles for the purpose of strengthening impaired functions of digestion in the human body.—M. Z. Just Water-closets.—H. T. Owens. Mode or manner of securely locking miners' safety lamps.—W. T. Walker. Gas scrubbers and apparatus connected therewith. J. G. Tongue. Machinery for decorticating, separating, and obtaining fibrous materials from various plants and trees (com.)—H. Hirsch. Screw propellers.

On December 24th.—4480 to 4505.—J. Dunbar and J. Ruston. Excavating machines.—F. Holthausen. Apparatus for lowering persons and property.—M. Benson. Telegraphic apparatus (com.)—W. Morgan-Brown. Gear tackle (com.)—H. M. Wilkinson. A new ink, applicable also for dyeing, colouring, and other purposes (com.)—J. Leber. Apparatus for binding the edges of hat and bonnet shapes or foundations and other articles.—S. F. Pichler and E. V. Gardner. Apparatus for raising and lowering weights.—T. E. Richardson. Roller skates.—R. Yates and G. Brierley. Looms for weaving.—R. Pritt. Apparatus for separating flour from middlings or sharps, separating and cleansing wheat or other grain. P. Jensen. Construction of fluid meters (com.)—J. P. T. Bordone. Steam-boilers with internal tubular fire-box.—J. Bickerton and J. Wormald. Apparatus for dissolving snow in public thoroughfares and other places.—J. Willis. Umbrellas and sunshades.—E. T. Hughes. Carving forks (com.)—W. White. Treatment of the sulphides of lead, zinc, and antimony, and separation of silver and copper from the lead.—J. Tough. Wheels for railway and tramway rolling stock, and apparatus for the purpose.—J. R. Boulcott. Diving apparatus, useful also for other purposes.—J. N. Adorno. Watches and clocks.—A. Souheur. Wheels of vehicles, and mode or means of connecting the same to their axles.—A. Souheur. Lamps.—F. Lipscombe. Apparatus for the admission of air to steam-boiler furnaces.—J. W. C. Perrier. Manufacture of kelp and apparatus employed therein (com.) — T.

Morgan. Safety apparatus for steam-boilers (com.)—E. S. Morris, E. E. Morgan, and D. Richards. Annealing or tempering sheet-iron plates and apparatus for that purpose, and for pickling the same plates.—A. M. Clark. Alimentary preparations for feeding cattle and other live stock (com.)

On December 27th.—4506 to 4508.—J. Keith. Boiler and furnace combined, for heating and circulating water or other liquids, raising steam, and for similar purposes.—D. Ross. Turnip topping and tailing machine.—B. W. Tucker. Dredging buckets and links for working same.

On December 28th.—4509 to 4517.—G. Keel. Combination foot gyrator or travelling facilitator.—H. A. Bonneville. Apparatus for warming railway carriages and others (com.)—J. Barrett. Carts.—Jhn. Cole and Jas. Cole. Steam engines.—W. R. Lake. Machinery for manufacturing spikes (com.)—W. R. Lake. Press suitable for copying and for other like purposes (com.)—H. Wilde. Manufacture of metal rollers for printing calico and other textile fabrics, partly applicable to the refining of copper.—G. Roby. Safes or vessels for containing gunpowder and for preserving and cooling substances.—A. M. Clark. Apparatus for interlocking railroad switches or draw bridges, and signals (com.)

On December 29th.—4518 to 4529.—W. Knell Screw drivers.—J. Gamgee. Manufacture of ice and artificial production of cold, and machinery employed therein.—J. Cryer and S. Morris. Self-acting mules for spinning and doubling.—E. Wernekinck. Motor impelled by compressed air or other fluid or liquid.—D. Thomson. Apparatus for raising, tipping, and lowering trucks—J. G. E. Sanderson. Machinery for obtaining motive power from the action of currents of wind.—W. R. Lake. Pantograph engraving machines (com.)—A. M. Clark. Tube stopper for steam boilers (com.)—A. M. Clark. Trap and grating for drain and sewer inlets (com.)—A. V. Newton. Apparatus for feeding sheets of paper to printing and other presses (com.)—T. Harries and G. Redford. Artificial fuel.—C. R. E. Grubb. Cigar lights.

On December 30th.—4530 to 4550.—J. Riley. Travelling combustion furnaces, and their application to the manufacture of soda ash, and other purposes.—A. F. Morrison. Apparatus for casting rain-water pipes and gutters, and similar articles.—A. Burnier. Manufacture of calyxes of tissue for artificial moss roses, and the polysepalus of such flowers as well as in mossy flowers in general.—W. F. Lotz. Lamps.—E. H. Griffin. Perfect separation of potatoes into different sizes or qualities.—J. Stewart. Securing nuts on bolts and studs.—L. D. Craig and C. Miller. Tenon joint fastening which is especially adapted for fastening the tenons of chair rounds in chair legs. (Complete specification.)—H. A. Bonneville. Caloric engines (com.) (Complete specification.)—P. Jensen. Fire-places (com.)—W. E. Whitehead. Machinery for opening, cleaning, scutching, and lapping cotton, and other fibrous materials.—G. Lowry. Radial arm drilling and shaping machines.—C. B. Andrew, W. Burrowes, and G. B. Attkins. Producing patterns or designs in metals, on silk handkerchiefs, ladies' scarves, and silk piece goods.—J. W. Duncan. Fire-arms.—L. Bakers. Roller skates.—W. J. Clark. High pressure steam generators.—J. H. Greathead. Roller skates.—P. Brotherhood. Motor engines worked by steam or other fluid pressure.—J. Barton. Screw letter copying presses.—H. Groom. Tins, boxes, cases, and other like receptacles for containing preserved meats, provisions, or other substances or liquids.—H. A. Egerton. Ships, ferry boats, and other vessels.—R. R. Gubbins. Blowers for forcing air.

On December 31st.—4551 to 4561 —J. H. Rutherford. Appliances for raising sunken vessels or other objects.—H. Bessemer. Reflectors, lenses, and optical glasses, and also machinery, tools, and apparatus employed in manufacturing and mounting the same.—T. W. Barber. Pipe organs.—W. H. Wragg. Cutlery.—A. Bünger. Street locomotives.—J. Keith. Sewing machines. (Complete specification.)—T. R. D. Bingham. Construction of paddle wheels.—J. T. Stoneham. Buttons, and the fixing or attaching same to articles to which they are required to be attached.—J. J. Kunstadter. Roller skates.—F. E. Degener. Apparatus for mixing soap and other materials (com.)—W. R. Lake. Machinery for manufacturing cigars (com.)

On January 1st, 1876.—1 to 15.—W. Howard. Ink erasers.—T. Keddy. Machinery for cutting straw, hay, and other like substances.—R. Boyle. Boiler furnaces of steam ships, or vessels for ventilating the vessel, preventing smoke, cooling the stoke-hole, and economizing fuel.—W. Trafford. Machinery for spinning, twisting, throwing, doubling, and reeling silk and other fibrous materials.—S. Bairnsfather and R. R. Harper. Signalling apparatus for railways, and the mode or method of applying and working the same.—F. J. Hamel. Manufacture of artificial fuel.—F. E. B. Beaumont. Motor engines worked by compressed air or other elastic fluid under high pressure —E. M. J. Le Bréton. Hydraulic motive power.—J. Fraser. Overhead sewing machines.—T. R. Allen. Manufacture of metal tubes. — W. Fiskin. Apparatus for the cultivation of land by steam or other power.—M. Bayly. Roller skates.—C. Rawson and W. Slater. Deodorizing and purifying sewage.—Sir J. Anderson and W. H. Ash. Electric telegraphs.—H. Hutchinson. Hydro-metallurgy, and apparatus used therefor.

On January 3rd.—16 to 28.—F. B. Hill. Pumps chiefly designed for steam fire-engines.—J. H. Palmer. Roller skates.—W. Shorrock. Double lift dobby for weaving. — W. S. Mappin. Roller skates.—S. A. Cooper. Fixing glass on building or other materials.—T. H. Hennah. Roller skates. — P. de Sa. Chimney pot. (Complete specification.) — O. Sweet, H. N. Sheldon, and J. R. M. Squire. Air pistols (com.) —T. Sutcliffe and J. Fewings. Apparatus and stoppers to be used for bottling aërated or other liquids.—J. H. Johnson. Apparatus for warming railway carriages and tram cars (com.) —A. M. Clark. Machine for scouring, fleshing, cleaning, and otherwise treating hides and skins (com.)—J. N. Smith. Axle boxes and oilers for railway car axles. — H. Guthrie. Pressing machines, generally used for solidifying granular substances, such as fire-clay, coal dust, or any other material of like nature for making bricks, tiles, fuel-blocks, or other similar matters.

On January 4th.—29 to 44.—H. N. Slater. Process of flocking cloth. (Complete specification).—G. E. Webster. Hosiery machines.—T. H. Johns. Apparatus for raising or forcing beer and other liquids.—H. S. Paget. Machine for cleaning, sweeping, and painting.—A. Robottom. Manufacture of soap or saponaceous compounds.—T. Lawrie. Pavements and fashioning stone to be used as pavements, and machinery or apparatus to be employed in the manufacture or production of the said improved pavements.—J. Fogo. Machine for "shawing," rooting, and delivering turnips.—T. Choules. Machinery or apparatus for cleaning and polishing boots, shoes, and similar articles.—W. R. Lake. Sewing machines (com.) —W. R. Lake. Eye cups (com.)—W. Marriott. Purifying coal gas.—R. N. Allen and A. B. Pullman. Railway wheels.—P. Gaskill. Apparatus for washing bottles.—J. White. Lamps.—J. Leeming and J. Whyte. Looms for weaving.—J. Wolff and R. Betley. Production of colouring matters capable of being employed for the purposes of dyeing and printing.

On January 5th.—45 to 55.—G. G. Davidson. Dental articulators. (Complete specification).—C. G. Roberton. Roller shoes and skates.—B. Smith. Signalling by electricity in opposite directions through the same wire simultaneously.—G. Holloway. Apparatus employed in the manufacture of paper.—H. J. Haddan. Lubricating oil cups.—A. C. F. Franklin. Apparatus for cooling brewers' worts and for other like purposes.—G. G. Capon and T. O. Boughtwood. Means for securing wine and other cases.—F. Darkin. Electric battery (com.)—H. H. Murdoch. Machine for winnowing, cleaning, and sorting semolina and "middlings," and corn and other seeds (com.)—J. H. Johnson. Presses, and apparatus connected therewith (com.)—A. M. Clark. Chains for hanging or suspending window sashes, doors, and other bodies, and connections for use therewith (com.)

On January 6th.—56 to 70.—H. E. Cauty. Apparatus for preventing draughts in dwelling houses and other structures.—C. Borzecki. Apparatus for producing perpetual motion.—W. Morgan-Brown. Indexing books and binding of same (com.)—J. M. Mathews. Locks or fastenings for doors.—J. Jackson. Bicycles.—E. G. Brewer. Floating and submerged boats, ships, and other vessels, and the mode of and apparatus for propelling the same (com.) —W E. Gedge. Apparatus for signalling on railway trains (com.)—R. Palmer. Manufacture of white lead.—J. Kincaid. Permanent way, chairs, and fastenings of tramways.—W. T. Garnett. "Fish-plate" or joint plate for rails.—B. J. B. Mills. Sewing machines and stands or tables for the same (com.)—E. Johnson. Shoes for horses and other animals.—W. Southwood. Machinery for making cut nails.—A. Browne. Processes for preserving and waterproofing old and new leather, hides and skins, either tanned or untanned, canvass, string, cloth and other fibrous and filamentous materials (com.) —T. Penny. Method of ticketing and exhibiting with security jewellery, watches, and other like articles.

On January 7th.—71 to 90.—E. Dyson. Paving blocks for streets, buildings, or any place where paving is applicable.—A. Pengelly. Bearings carrying a spindle.—C. Barlow. Press for forming concrete and other paving and building blocks (com.) (Complete specification.)—C. Barlow. Railway car axles (com.) (Complete specification.) —C. Barlow. Machinery for manufacturing blocks, concrete, artificial fuel, &c., &c. (com.) (Complete specification.)—H. Geary. Effecting the combustion of certain fuels for the generation of steam.—W. Barclay. Tramways, tramway cars, and apparatus connected therewith, partly applicable to other purposes.—J. Gillies. Machinery or apparatus for charging and corking bottles or other vessels with aërated liquids.—H. R. Robson. Steam boilers.—M. I. Landau. Apparatus for heating, ventilating, lighting, and cooking purposes.—H. Knight. Pigments, and manufacture thereof.—A. Woolrich. Trowsers.—R. L. Hattersley. Looms for weaving.—F. H. Wright. Machinery for combing wool and other fibres.—J. T. Trench. Apparatus for warming greenhouses and other buildings, and for burning lime.—J. Sample. Screw-propeller.—W. Payton. Engines to be actuated by steam, air, or other fluid, also applicable for raising and forcing liquids.—S. Thacker, gas-engines.—H. Hirsch. Construction of ships and other vessels.—A. M. Clark. Friction clutches (com.) (Complete specification.)

On January 8th.—91 to 104.—R. P. Wilson. Apparatus to be employed in testing petroleum and other liquids.—E. Cowles. Apparatus for mixing or stirring liquid or semi-liquid or pulverous substances.—J. Blair and A. Blair. Clipping lappets, and machinery or apparatus employed therefor.—H. Harding. Concrete-building.—A. Thomson. Couplings for shafting.—E. C. Vickers. Manufacture of boots, shoes, and leggings, also applicable to the manufacture of other articles of utility.—S. F. Pichler. Construction of walking figures to be employed for public exhibitions, and construction and arrangement of mechanism and appliances to be used in connection therewith.—J. Moore. Apparatus for heating and warming rooms, buildings, and other places.—H. Ward, J. Ward, and W. Ward, jun. Brick-making machinery.—H. Pooley, jun., and J. Wood. Steelyards of weighing machines.—W. J. Dann. Manufacturing hosiery goods.—T. Benstead. Reaping machines.—J. Bedford. Machinery for cleaning grain, rice, or seeds, or "bolting" flour, and separating and purifying "middlings" made therefrom.—J. Urquhart and W. W. Andrews, Wet gas meters.

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The various efforts which have been made, and the numerous influences now at work to injure, if not destroy, Patent Rights; the inefficiency of the many well-intended, but ill considered, Schemes of Patent Law Reform, which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor without advantage to the Public; together with the proceedings so essentially involving the interests of Inventors which have already taken place in Parliament, as to the propriety of abolishing Patent Rights altogether, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organising the influence of Inventors, Patentees, and others. Its objects are:—

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2nd. To promote improvements in the Patent Laws.
3rd. To facilitate the diffusion of information with reference to Inventions, and other subjects beneficial to Inventors and Patentees.

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